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Cost of Erecting Structural Steel.

BY WILLIAM ARTHUR.*

A long while ago a body of men undertook to build a tower reaching clear up to heaven, and they failed. They had made the common mistake of taking a large contract on a poor estimate. This is a dangerous thing to do, as well for contractors in our day as it was for the ancients.

We have now, however, taken the advice of the wise man and limited our ambition. We do not attempt to reach so high in the air, and when we do soar to a limited height we do not use "bricks and slime" for our building material, but structural steel. If we cannot scale the heavens with this material we can at least go thirty stories in the right direction, and forty are now spoken of by the daring. Some years ago I stood under the Eiffel Tower, and it looks high enough to make one sure that if ever another Tower of Babel is attempted, steel will be the material used in its construction.

How much does it cost to erect steel and iron? With all kinds of towers, bridges and sky-scrapers to consider, we should require a roomful of experts to tell us, and we may be sure that they would not agree. In this short article I shall keep close to earth and deal only with such steel and iron as the average contractor has to set with average equipment.

On buildings of one to three stories, using a hand derrick, allow 25 hours of one laborer's wages to set a ton of 2000 lb. This will usually set the cast-iron and steel in store fronts, vaults, interior columns and beams. With wages at 20c. per hour this is $5 per ton, which is a fair figure that can be reduced 20 per cent. on some kinds of work with favorable conditions, and on almost all kinds, if there is sufficient tonnage to justify the use of a steam derrick. This figure is based on setting all the work with unskilled labor, under the direction of a good foreman. Although the setting, even using a hand derrick, is sometimes done for about 17 hours of a laborer's wages, it is not usually safe to cut down to the limit and leave nothing for contingencies.

For ordinary structural work, such as columns and girders, on buildings of four to six stories, the extra cost should not be more than one laborer's wage per hour per story for a ton, with a hand derrick, and half as much if steam is used. Loading and setting are the same, and the extra cost is in the hoisting.

During the last decade especially, an enormous amount of steel tonnage has been put into manufacturing plants—machine shops, boiler shops, shipbuilding establishments, foundries, rolling mills, bridge-building works, factories, and so on. On three large buildings of this kind, with a width of 150 ft. and an aggregate length of 1200, the weight of structural steel was more than 2000 tons. The accurate figures for the setting, received after the work was done, ran to less than my estimate. On the first building the cost was $7 per ton; on the second, $6.50; on the largest and most difficult to set, $7.90, with laborers' wages about 20c. per hour, and skilled riveters, for field riveting only, at 40c. This makes the average figure $7.13 per ton, but is on the basis of hoisting engine, compressed-air riveter, scaffolding, ropes, tackle and general equipment all ready at hand, as no allowance is made for their use. If a contractor had to purchase a new equipment the cost would amount to more than one contract was worth. Nearly one-fourth of the total amount was paid out for riveting.

But, at the same rate of wages, $9 per ton is as low a figure as should be used for an estimate, as unforeseen contingencies might arise, large enough to swallow up the extra dollar. But, again, on some jobs everything seems to go in the right way to fill the pocketbook, and the labor, estimated at $8, might be done for $6. Estimating, in spite of all theories, is not an exact science. Accidents, zero weather, delays, ill-fitting material—there are quite a number of casualties to be guarded against, and the only safe course is to make a reasonable allowance for them. I know of contractors who have tried the other way to their sorrow. On some locomotive shops recently built the steel amounted to 2400 tons, and a difference of $1 per ton in labor amounts to a respectable sum of money.

The trusses on the foregoing buildings were about 40 ft. from the floor at the eaves, but the extra time required for hoisting and setting work at this hight was more than balanced by several thousand lineal feet of heavy girders 3 ft. 6 in. wide midway between floor and roof, and the large columns necessary to hold them, with traveling crane of 100 tons.

On such heavy locomotive works the structural steel runs from 40 to 45 per cent. of the total cost of the building; of car shops, with lighter design, from 24 to 28; on foundries, 32 to 35; on blacksmith shops, 18 to 20 per cent.

There are about ten field rivets to the ton on such work, and a pneumatic riveter will average from 500 to 600 in a day.

But what if, after all, our buildings of the future are to be without steel? Who knows? We may be now passing from the steel age into the cement age. While in Los Angeles the other day I examined a building to be ten stories high, I think—and it has no steel, except rods, in its construction. From footings to roof it is built of reinforced concrete. It is one of two under construction now in that bustling city. There is another in Milwaukee, but the highest of all is in Cincinnati. The developments in high cement buildings are startling, but it is likely that we shall continue to use steel also for ages yet to come.

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Zinc Mining in Tennessee.

The production of zinc ore in Tennessee in 1904 was small, a little carbonate ore taken from surface diggings at New Market, Tenn., representing the total output. There was some development work done at Straight Creek, in Claiborne county, by Cincinnati parties into whose hands this property passed about a year ago; they are said to have discovered a shoot of blende and calamine, but have not yet done sufficient work to establish its importance, or continuity. They are now engaged in erecting a mill to see if they can treat the ore, which is an exceedingly fine grain in combination with a hard blue limestone. They shipped nothing during the year.

The owners of the Roseberry mine at Mascot, Tenn., about 12 miles north of Knoxville, have done some diamond drilling, which shows blende at considerable depth; they have since sunk a shaft something over 100 ft., and claim that they are opening an encouraging deposit of blende, but they have not so far put anything on the market, although the property is equipped with a very good mill.

It is possible that more will be heard of both of the above named properties during the present year.

The Nichols Copper Works.*

BY O. PUFAHL.

These extensive works are at Laurel Hill, Long Island, N. Y. Ores and mattes are purchased from outside producers. Crude copper, containing precious metals, is refined by electrolysis on the series system.

The ores, together with between-products from the smelting and refining processes, are smelted in two water-jacketed Herreshoff furnaces. Each of these furnaces has nine tuyeres on its long sides, a cross-section at the hearth of 46 by 120 in., and a charging depth of 7 ft. above the tuyeres. The blast, at pressure of 1 to 1.5 lb. per sq. in., is furnished by two Roots blowers. The matte and the slag flow in an uninterrupted stream to a large settler, whence the slag overflows into pots of the usual type. The matte is tapped off into an iron bed; its composition is approximately 40 to 60% Cu, 40 to 20% Fe, and 20% S.

In 24 hours the furnaces treat a charge of 210 tons of ore and flux, with consumption of 8 to 9% of coke (or 14% figured on the ore in the charge).

Converting.—All the mattes, both those purchased and those produced at the works, are melted down in a water-jacketed cupola furnace, the coke consumption being 9%; the produce is tapped off direct into converters. There are four sets of three converters each, two being usually in operation. The converters are lined with a mixture of 85% of crushed quartz and 15% of clay, ground and mixed in three edge-runner mills with revolving bottoms. The lining is stamped in place by hand, using iron or wooden rammers and a wooden pattern. The lining is 1.5 ft. thick.

According to the state of wear of the lining, and the enlargement of the internal volume of the converter, the charge varies from two to six tons. The blast is admitted by eleven nozzles at a pressure of 8 to 10 lb. per sq. in. The time of treatment for a charge is two hours. In 24 hours, four converters produce 150,000 lb. of copper, containing 99 to 99.25% Cu, 50 to 100 oz. of silver, and 1 to 2 oz. of gold per ton. After every 10 to 16 charges, the converter is relined. The blast for the converter plant is furnished by two blowing engines, of 100 and 120 h. p., respectively. The converters are moved by hydraulic machinery.

The waste gases from the different furnaces, and also those from the converters, pass off to a main flue 1000 ft. in length and constructed in part (about seven-tenths) of iron; the rest is of brick work. This flue communicates with a 300-ft. chimney. From the flues, about 100 tons of flue dust is recovered per month; this is briquetted and sent to the blast furnaces.

Refining.—Nearly 90% of the raw material worked up by the company is purchased in the form of blister copper. The first step is to take average samples for analysis by the checker board method. The smelting down of the blister copper represents a fairly thorough refining process, inasmuch as electrolysis, by the series system, requires particularly pure anode copper. The anode plates are pressed smooth between rollers after casting.

The installation comprises 10 reverberatory furnaces, each taking a charge of 40 tons, with a hearth lining of quartz sand containing a small proportion of feldspar. The metal is poured from a ladle by a Herreshoff casting-table with nine anode iron molds, the workmen standing at the center of the table. There is one pouring-table, consuming only ¼ h. p., in front of each furnace. One tubular boiler is heated by the waste heat of each furnace. The anodes are about 59 in. long, 16 in. broad, and ½ in. thick; they weigh on an average 67 pounds.

For melting down the cathodes, eight reverberatory furnaces, (with charges of 30 to 45 tons) are used. The copper is cast mostly into wire-bars, in molds which are painted with a mixture of lamp-black and benzine after every use. It takes five hours to pour one charge. A workman manipulates the sliding doors of all the furnaces from one central stage.

The purity and conductivity of the copper are said to be high. Three small test-bars are cast from every charge; the first on starting the pouring operation, the last toward the end. From these small bars, rods are cut, which are first rolled, and finally drawn out into wire; they are tested for conductivity, according to the accepted directions of the Bell Telephone Company.

The current for the electrolytic plant is generated by 17 dynamos, each of 800 amp. and 155 volts.

*Translated from *Zeit. f. Berg. Hütten, u. Salinenwesen*, 1905. p. 400.

The white color of palladium and its freedom from corrosion and tarnishing render it capable of use for plating where the cost is not prohibitive.

The second largest stone-arch bridge in the world—a railway bridge at Salcano, Austria—was recently completed. The arch has a span of 279 feet.

Glue should not be heated in a pot that is subject to the direct heat of fire; it is very easily burned and rendered useless.

In an English granite quarry, at a test of four air-hammer drills, the best machine did one foot in 9 min. and the next machine one foot in 14 min. In a slate foot-wall the same machine did one foot in 2 minutes.

Flotation Processes.*

BY A. K. HUNTINGTON.†

This paper has reference to the processes of Potter and Delprat, and is specially concerned with flotation by means of CO_2. These "flotation" processes have been successfully applied in concentrating the metalliferous portion of certain tailings, produced in the treatment of the sulphide ores of Broken Hill.

The Broken Hill ores are composed of an intimate mixture of sulphides of lead and zinc, with a gangue mainly composed of garnet, quartz, and rhodonite with small quantities of rhodochrosite, siderite and calcite.

The following analyses given by the Broken Hill Proprietary Co. in an inquiry in the Supreme Court, Victoria, show the composition of the tailings from the Broken Hill district:

	Broken Hill Proprietary No. 1.	Block 10 Mine.	Central Mine.
	%	%	%
PbS	6.62	5.31	1.18
ZnS	25.37	34.86	37.89
Cu_2S	0.18		0.12
FeS_2	2.88	2.58	2.88
FeS (in blende)	2.37	2.25	2.32
FeO	5.61		4.76
MnO	11.23		9.55
Al_2O_3	6.90		4.06
CaO	3.94		2.92
CO_2	0.44	1.50	1.40
SiO_2	32.70		24.30

The flotation process consists in adding to the tailings either a solution of dilute sulphuric acid, say 2½ to 10% (Potter's process) or a solution of acid sulphate of soda (Delprat's process), at a temperature of about 65° C. Under these conditions the metallic sulphides are floated up by attached bubbles of gas and form a coherent scum which can be removed, leaving behind the earthy matter. When carefully carried out the separation is practically a quantitative one.

The question we have before us is, Why do the gas bubbles attach themselves to and lift the sulphide particles and not the gangue? What we have to account for is the mechanism of the adhesion of the gas bubbles to the sulphide particles.

It has been shown beyond question that the gas which is concerned in the flotation is CO_2. It was at first assumed by some that the CO_2 was derived from calcite, and by others that it came from carbonates produced on the surfaces of the sulphides by weathering. This latter supposition cannot be correct, because the Broken Hill ores at present mined are obtained from a depth below the water-level, and on examination have been found to be free from weathering. On going in-

*Abstract of a paper read before the Faraday Society, Dec. 12, 1905.

†Professor of metallurgy in King's College, London.

to the matter I was able to prove that the CO_2 which gives rise to the flotation is librated mainly from the rhodochrosite and siderite, and certainly not from the calcite.

For this purpose I made a flotation experiment with Broken Hill "Block 10" tailings, using a H_2SO_4 solution. So soon as the flotation had proceeded as far as it could go (about two minutes) the solution was separated from the tailings and analyzed. The following is the result calculated as carbonates: $FeCO_3$, 1,30%; $MnCO_3$, 1.85%; $CaCO_3$, 0.15%; $ZnCO_3$, 1.27%.

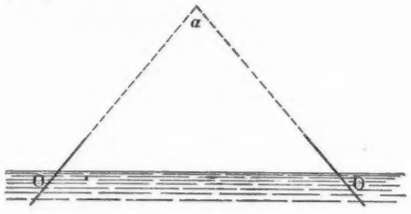


FIG. 1.

It will be observed that the quantity of $CaCO_3$ is very small, but of course that might be due to the slight solubility of $CaSO_4$. Another experiment was therefore made in which HCl was used instead of H_2SO_4, with the following result: $FeCO_3$, 1.87%; $MnCO_3$, 1.61%; $CaCO_3$, 0.55%; $PbCO_3$, 1.20%. Here again the $CaCO_3$ is very little, although $CaCl_2$ is very soluble. The merest trace of sulphureted hydrogen, if even that, is given off.

In 5% sulphuric acid, native iron carbonate is not acted on until a temperature of about 65° C. is reached, which is the temperature at which flotation takes place with the sulphide ore. Carbonate of manganese behaves in a similar manner. If either be added to sulphide tailings from which the CO_2 has been removed by previous exhaustion, with acid and washing

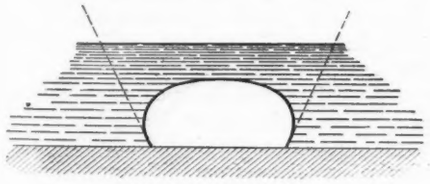


FIG. 2. GAS BUBBLE.

In contact with solid having a high angle of contact.

without drying, and acid or acid sulphate be added, as good a flotation is obtained as with the tailings from which the CO_2 had not been removed[1].

Carbonate of lead gave no flotation, the action of sulphuric acid on it being very feeble, owing to the formation of an insoluble coating of lead sulphate.

[1]Cleveland oolitic carbonate and other specimens of clay ironstones gives a very poor flotation with Broken Hill tailings. The sulphides distinctly separate from the gangue, but will not float to the surface. This is probably due to the presence of the clay. But graphite floats perfectly after being washed with alcohol, when Cleveland ore and acid are added.

Zinc carbonate when added to sulphide ore is readily acted on in the cold, and practically gives no flotation of sulphides with either a cold or a hot solution. Owing to the crushed native carbonate being light and spongy, it floats in the solution and generates the gas there rather than on the ore. So far as I could judge, if naturally present in the ore it would give, if any, a very unsatisfactory flotation, which is characteristic of carbonates decomposed in the cold. Sodium carbonate gives no flotation, but separates the sulphides and the gangue into two layers; and calcium carbonate, although it gives

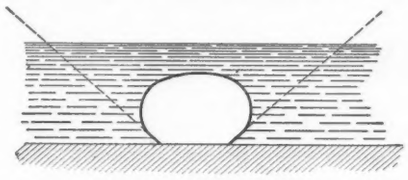


FIG. 3. GAS BUBBLE.

In contact with solid having a lower angle of contact.

a certain amount of flotation, does not give rise to a true scum, but only to a floating spongy material, the remainder of the sulphide falling back upon the top of the gangue. A sample of yellow dolomite, when treated with H_2SO_4, gave off some CO_2 at about 30° C., and at about 40° C. the sulphides of the tailings (previously exhausted of CO_2 and washed with alcohol) were lifted, but no coherent scum was formed, the sulphides falling back.

A copper ore, veined with $CaCO_3$, on slightly warming (it was a very cold day) gave off abundance of CO_2, and the finer particles of sulphide floated without, however, forming a good and permanent scum. After the CO_2 had all been exhausted the whole of the sulphide was easily floated by adding $FeCO_3$.

It has been stated that tailings can be

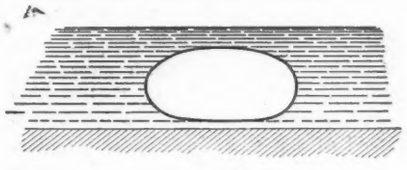


FIG. 4.

GAS BUBBLE ON COMPLETELY WETTED SOLID.

The thickness of intervening film of liquid is exaggerated.

exhausted of CO_2 by the action of acid in the cold. The following experiment was made, which does not bear out this statement, and goes to corroborate the other evidence that the CO_2 is not derived from calcium carbonate.

Twenty grams of Broken Hill tailings and 25cc. H_2SO_4 (5%) were placed in a flask fitted with a cork and delivery tube dipping into paraffin. No gas was evolved in 24 hours, and on decanting off the liquid and heating no gas was obtained. On adding fresh acid to the residue and heating, a normal flotation occurred.

It has also been suggested that the reason why the flotation does not take place until the temperature has been raised is that the CO_2 is at first absorbed by the solution. I have made an experiment in which the solution was first saturated with CO_2, but it made no difference; the flotation did not begin until the usual temperature was reached.

I have also shown experimentally that only acids which attack carbonates of iron and manganese are of any use, and that this only takes place in a hot solution.

I find, however, that sulphur or graphite mixed with calcite and treated with H_2SO_4 in the cold completely float, even when these bodies have been previously thoroughly wetted by grinding them with glycerol.

These experiments, coupled with the fact that $CaCO_3$ does not give good flotation with tailings exhausted of CO_2, is enough to show conclusively that $CaCO_3$ is not the source of the CO_2 causing flotation of the Broken Hill sulphide tailings. Beyond that we have the fact that no carbonate which is decomposed easily in the cold gives good flotation, or indeed flotation at all, with the exception of $CaCO_3$, which gives a poor flotation. Crystalline $FeCO_3$ and $MnCO_3$, are in fact the only carbonates which give flotation with a true coherent scum. $FeCO_3$ and $MnCO_3$ in the precipitated amorphous condition do not give any flotation. In that state they are easily decomposed by acids in the cold.

Experiments were likewise made to obtain flotation with CO_2 by using a solution into which it had been compressed, the solution being finally warmed. Success did not attend the attempts to float sulphides in this way.

I feel justified, therefore, in assuming that the effective CO_2 in the flotation process as applied to Broken Hill tailings is derived from minerals composed of crystallized carbonates of iron and manganese.

We have now to consider the cause of the preferential adhesion of the gas bubbles to the sulphide particles. At one time I considered that the flotation of sulphides by gas was due to surface tension. About a year ago I wrote: "The flotation in both the Elmore process and that of Potter is determined by surface tension, and it is immaterial whether the surface tension be brought about by a liquid or by a gas which might only differ in being different phases of the same matter." Subsequently while carrying on experiments on flotation, it occurred to me that the flotation in some way might be due to electrostatic action. This idea led to my making a great many experiments which, although they have not proved that electrostatic action plays any part in flotation, yet have disclosed the fact that electrification does take place when sulphuric acid acts on the tailing. However, I have been unable to obtain any evidence that the electrifi-

cation, which undoubtedly occurs, plays any part in the flotation.

Messrs. Swinburne and Rudorf, in their paper, on the physics of flotation[2] draw inferences and report experiments which will not bear examination. This can easily be demonstrated. They make a point of the necessity of slight weathering of the sulphides, and that the gas should be produced at the surface of the particles themselves. I have demonstrated many times that the sulphides in Broken Hill tailings, after being thoroughly digested with hot sulphuric acid, which would remove the products due to weathering if present, and washed thoroughly, can be made to float just as satisfactorily as in the case of untreated tailings, by simply adding a small amount of spathic iron ore and a little more acid.

In case it might be said that a film of air might be clinging to the sulphides and help them to refloat, I have had them thoroughly washed with alcohol, which wets them, and then with boiling distilled water, before attempting to refloat them. Further, if a piece of massive galena or blende free from matrix be taken from the interior of a lump and immediately immersed in dilute H_2SO_4 and carbonate of iron be added, globules of CO_2 will rapidly attach themselves to the mineral. The same thing happens with sulphur, galena, stibnite, molybdenite, and with metallic copper and tin. But bubbles do not attach themselves at all to quartz. In the case of magnetite, which, however, is not present in these tailings, minute bubbles become attached, but they never grow larger, as in the other cases mentioned.

My experiments clearly showed that the presence of an air film was not necessary in order to obtain flotation of the sulphides in the tailings. I took every precaution I could think of to remove any air film which might be present. Thus Broken Hill vanner tailings were exhausted of CO_2 by boiling with dilute H_2SO_4 washed, mixed with $FeCO_3$, washed with alcohol, exhausted by pump, washed several times with hot distilled water free from air, and finally exhausted with pump. After all this, on adding freshly boiled and still hot H_2SO_4 (10%) a perfectly normal flotation of the sulphides was obtained. In the case of other sulphides removal of the air by washing with alcohol, etc., was not found to make any difference in the flotation. Sulphur, which retains air rather persistently, on being treated with alcohol sinks and appears to be wetted, the color becoming darker. On replacing the alcohol by H_2SO_4, the sulphur remains at the bottom, but it floats perfectly on adding $FeCo_3$ and warming[3].

Finally I had experiments made in which all the sulphides and tailings I had worked on were first wetted with alcohol and then washed with water before attempting to float. I did this because I found that otherwise air entrapped in them or condensed on them caused a certain amount of flotation and prevented the results being comparable. Some sulphides which previously had given partial flotation then gave none, *i. e.*, the sulphides did not float to the surface and remain there as a scum, they only floated up a certain distance and then fell back. Of course to do even that there must have been a selective attachment of the bubbles. In such a case the sulphides form a distinct layer above the gangue. The sulphides in question were some almost colorless bl ndes free from iron and two specimens containing 13.5% FeS and 15.5 % FeS respectively. The colorless specimen had at no time given anything but an insignificant scum, but the others had given very variable results. As has been stated, after washing in alcohol nothing whatever floated to the surface when carbonate of iron and H_2SO_4 were added. All three were massive, *i. e.*, practically free from matrix.

This brings us to a curious and interesting point. On mixing an equal bulk of a lightish red sand with the mineral, the whole of the blende floated in all three cases, giving a very good coherent scum. In order to satisfy myself that this result was not due to any special property of the sand, I substituted for it magnetite and obtained a precisely similar result. The only way I can account for this result is by assuming that when there is insufficient gangue the sulphides overload the bubbles and fall off them before they reach the surface. Why all the sulphide should leave the envelope of the bubble instead of a portion is difficult to understand, and I confess I am not altogether satisfied with the explanation; unless it be that the particles, having been brought into contact with one another by a well-known effect of surface tension, drag one another off when there is overloading. On the other hand, I have found that in the case of vanner tailings giving a very good flotation, a bad flotation might be brought about by the addition of a large quantity of sand. In this case the sulphides appear to be too much diluted with inert matter. These results have practical importance, as they show that a certain ratio is necessary between the floatable and non-floatable material, and that as a rule it will be necessary that the ore should undergo suitable dressing operations before being treated by the flotation process. I have recently tried to float a sample taken from a solid lump consisting of practically nothing but blende and galena, and failed until I added sand. The Broken Hill vanner tailings appear to be ideally suitable for the flotation process.

These experiments dispose of Messrs. Swinburne and Rudorf's contention that blende scarcely floats at all, and incidentally of the statement that "zinc sulphide is thus easily raised by galena when intimately associated." In any case, it is difficult to see on what grounds they made this statement, because they also say "galena is fairly easy to float if finely ground, but owing to its rather high specific gravity very fine pulverization is necessary to float it successfully." Yet they are not surprised that it should float when loaded with what they consider inert blende.

It was just this fact, that blende floated with the galena in the case of the Broken Hill tailings, that made me believe that under suitable conditions zinc blende by itself would give a good flotation.

This view was strengthened by some experiments I made on the wetting of sulphide surfaces. The angle which a given liquid makes with a given solid is a constant, and is a measure of the degree to which the solid is wetted by the liquid. The mineral to be examined was attached to the arm of a goniometer by sealing-wax, a freshly fractured cleavage fa- being set as nearly as possibly parallel to the arm. The mineral was then dipped into water, and the goniometer rotated until the meniscus disappeared; that is, until the horizontal surface of the liquid cut the crystal sharply. The angle which the liquid then makes with the solid is the contact angle. The specimen was then reversed and the arm turned through the angle α until the meniscus again disappeared. Then $\theta = (180 - \alpha) \div 2$.

The figures given below are the means of a great many observations which differed but little in any one series. Of course, only rather small cleavage faces can be obtained, and the fractured surface of a mineral is apt to be somewhat stepped, which makes it difficult to get identical readings from different specimens. It will also be observed that in the case of blende the readings vary with the directions of the cleavage. Still the results, though they have no pretensions to extreme accuracy, make it quite clear that blende is not wetted any more than galena.

Pale yellow blende	55°
" " " another piece	63°
Dark blende on principal cleavage	53°
" " another cleavage	69°
" " principal cleavage	50°
Galena	48°
Stibnite	47°
Quartz	Completely wetted.
Magnetite	" "

Alcohol wets the mineral sulphides thoroughly. On removing the specimen from the alcohol and placing it in water it is again not wetted. A clean piece of blende treated in this way appears at

[2]The JOURNAL, Feb 10, 1906, p. 276.

[3]There are certain processes more or less in embryo in which it is proposed to obtain flotation by means of air films coating the sulphides. In such cases the ore has to be brought very carefully on to the surface of the water so that the gangue or easily wetted portion may sink and the sulphides which are not well wetted may remain floating. What is aimed at is to prevent the sulphides from sinking, which is a different thing to making them float up from the bottom of a solution as in the Potter and Delprat processes. This can only be done by means of a gas generated in close contiguity with the sulphides.

first to be still wetted, the meniscus being concave whatever the angle of immersion, but on draining off the water, standing drops remain showing that there is not real wetting. I have since found that this behavior was also observed by Degen in 1836 when experimenting with substances not wetted by water but wetted by alcohol.

It is difficult to understand why Messrs. Swinburne and Rudorf ever relied on the presence of an air film and weathering to support the theory of flotation by the effects of adhesion and surface tension. There appears to be no necessity for it whatever on theoretical grounds, and experiments show that neither an air film nor weathering is in any way essential.

I would suggest that whether a given substance can be floated or not by the process under consideration depends on the angle of contact which the solution makes with the substance at a free surface, and that the free surfaces are supplied by the gas bubbles which as they are generated come into contact with the mineral particles. There appears, in fact, to be nothing to prevent the bubbles coming into intimate contact with the solid particles. The extent of the surface of the gas bubble which will be in contact with the solid will depend on the nature of the liquid and of the solid concerned; in other words, on the contact angle of the liquid with the solid. If the angle is such as to cause a relatively large surface of the gas to be in contact with the solid and the bubble is sufficiently large and sufficiently light in relation to the particle then the gas bubble will float the particle. Actually the bubbles are usually coated with a number of fine particles. In any case, once the bubble has impinged on the solid—always supposing that it has an angle of contact different from 0°, *i. e.*, that the solid is not completely wetted—it cannot be detached except by the application of extraneous force, such as for instance agitation. The less the wetting the greater will be the force required to detach the bubble. If the surface of the solid is wetted, then the bubble has no attachment at all.

The foregoing are the conditions found in the Potter and the Delprat flotation processes as applied to Broken Hill tailings, and that is why the sulphides float and the gangue, which is easily wetted, does not.

A recently patented process for zinc electroplating uses an electrolyte composed as follows: 450 gal. water; 500 lb. commercial hydrochloric acid of 18 deg. B., and 200 lb. sulphuric acid of 66 deg. B. These are mixed. Metallic zinc is dissolved in this to saturation, and water is added to reduce the density of the bath to 9 deg. B. To each gallon of the solution, one pint of a saturated solution of oxalic, citric, tartaric or other vegetable acid is added.

A Large Steel-Concrete Stack.

The following are particulars of what is believed to be the largest and highest concrete chimney in the world, recently completed at the Butte (Mont.) Reduction Works:

The inside diameter (both top and bottom) is 18 feet, and the height of the chimney is 333 feet 4 inches, or 352 feet 7 inches above the surface; the top of the chimney has also the rather uncommon altitude of 5,791.3 feet above the sea level. The foundation of the chimney goes 7 feet below the surface, the lower portion being formed of slag poured in the molten state into a gray-iron casing 100 feet square, giving an area of 10,000 square feet. This process was repeated six times, giving a foundation 18 feet deep, tapering to 66 2-3 feet square at the top, and full of various forms of metal sown through the slag. As 7 feet of this are in the ground, there is necessarily a height of 11 feet above the ground. The base, which rests upon the slag foundation, is of Portland cement concrete, 42½ feet square and 8¼ feet high in the center, the concrete also having metal distributed through it, some of which projects up above the base, to help retain the walls of the chimney, having a resemblance to the roots of a tree. The chimney proper was formed in a system of sectional molds 3½ feet high, which, when coupled together, formed a complete ring. The concrete walls contain vertical and horizontal steel bars, the number reducing as the height increases, and also rings of 1-inch T-iron wired to the bars. For the first 21 feet in height of the chimney the walls are 18 inches thick, and in these walls are the two inlets to the chimney, one on each side, each opening 8x17 feet. On top of the 18-inch wall starts the double shell of the chimney, the outer shell being 9 inches thick, the inner shell 5 inches thick, these shells being separated by a 4-inch air space, which, at the bottom, is connected to the atmosphere through the outer shell by port-holes. The inside shell extends up to a height of 101½ feet above the base, and the outer shell is offset over the inner shell, as can be seen on the exterior of the chimney, the air space being left entirely open on the inner side of the chimney, and the inner shell perfectly free from the outer shell at the top. The outer shell is then carried 7 inches thick to the top of the chimney. The outside diameter of the chimney at the bottom is 21 feet, and the diameter of upper shell is 19 feet 2 inches.

The weight of chimney is as follows: Slag foundation, 12,800 tons; concrete base, 1,000 tons; chimney proper, 1,475 tons. This chimney, besides being the largest and highest concrete chimney in the world, is one of the largest chimneys of its height in the United States, as can be seen by comparing its dimensions with those of the following examples of some large chimneys in this country: The Washoe Copper Company's, at Anaconda, which is the largest in the world, is constructed of brick, and is 30 feet inside diameter and 300 feet high; the Metropolitan Street Railway Company's, New York city, of brick, 22 feet inside diameter, 353 feet high; the Clark Thread Works, Kearney, N. J., of brick, 11 feet inside diameter, 335 feet high; Omaha and Grant smelter, Denver, Colo., of brick, 16 feet inside diameter, 350 feet high; Orford Copper Company's, Constable Hook, N. J., radial brick, 20 feet inside diameter at the base, 13 feet at the top, 360 feet high; Tacoma Smelting Works, Tacoma, Wash., concrete, 18 feet inside diameter, 300 feet high.

It was originally intended to build upon this slag foundation a brick stack. However, the stack was built of concrete, according to the design of the Weber Steel-Concrete Chimney Construction Company, of Chicago.

Barytes Mining in Virginia.

In connection with some of the barytes deposits of Virginia, the mining problem is very simple. In fact the problem is not one of mining, but rather of handling the material by industrial railways and other similar appliances. However, the deposits are so scattered and so small that it makes the problem rather difficult, inasmuch as the proper appliance to handle the dirt and ore to the best advantage would clean out some deposits in a few weeks.

The best and most available barytes occurs in a sort of loamy dirt. An ideal way to handle this would be to put in a steam shovel and log washer, somewhat as brown ore is handled in the South, but as a thousand tons of barytes from one lease is an exceptionally large amount, it would be impractical to instal such a plant. The usual method is to make an open cut, follow the barytes where it leads and reject the dirt. Below the dirt the barytes runs into the limestone, and if that is in such a place that cheap transportation is available it pays to work.

In some places, far from the railroad, the cost of teaming is greater than the cost of mining. The limestone deposits might be worked more easily by the use of jigs. The uncertainty of the business, however, has prevented such innovations. In the Virginia district it is rather hard to accumulate sufficient barytes to run a good sized mill. The soft nature of the barytes is rather against mechanical handling, and even if there were a sufficient amount to warrant putting in a steam shovel and washer, the waste might be too great. The best and most abundant deposits seem to be the farthest from the railroad. If they were all concentrated at one point, barytes mines would be a good proposition.

Smelting Zinc Retort Residues.*

BY E. M. JOHNSON.

The following notes were taken from work done at the Cherokee Lanyon Smelter Company, Gas, Kansas, in 1903. It was practically an experiment. The furnace was only 36 by 90 in. at the crucible, with a 10-in. side bosh and a 6-in. end bosh. There were five tuyeres on each side with a 3-in. opening. The side jackets measured 4.5 ft. by 18 in. The distance from top of crucible to center of tuyeres was 11.5 in.

The blast was furnished by one No. 4½ Connellsville blower. The furnace originally was only 11 ft. from the center of tuyeres to the feed floor, and had only been saving about 60% of the lead. This loss of lead, however, was not entirely due to the low furnace. As no provision had been made to separate the slag and matte, upon assuming charge I raised the feed floor 3 ft., thereby changing the distance from the tuyere to top of furnace from 11 ft. to 14 ft. Matte settlers were also installed. These two changes raised the percentage of lead saved to 92, as shown by monthly statements. The furnace being small, and a high percentage of zinc oxide on the charge, the campaigns were naturally short. The longest run was about six weeks. This was made on some residue that had been screened from the coarse coal, and coke, and had weathered for several months. This particular residue also carried about 10% lead. The more recent residue that had not been screened and weathered, and was low in lead, did not work so well. Although these residues consisted of a large proportion of coal and coke, it seemed impossible to reduce the percentage of good lump coke on the charge lower than 12.5% or 13%. At the same time the reducing power of the residue was strong, and with the normal amount of coke caused some trouble in the crucible.

When residue containing semi-anthracite coal was smelted, the saving in lead dropped, and the fire went to the top of the furnace, burning with a blue flame, thereby necessitating the reduction of this class of material. This residue had been screened through a five-mesh screen, and wet down in layers, becoming so hard that it had to be blasted. The low saving of lead with this class of material was a surprise, as it has been claimed that the substitution of part of the fuel by anthracite coal did not affect the metallurgical operations of the furnace.

The slag was quite liquid and flowed very well at all times. However, there was a marked variation in the amount at different tappings. This, I am satisfied, was not due to irregular work on the furnace, but may be accounted for in the following manner: The residue (not screened or weathered to any extent), consisting approximately of one-half coal and coke, was very bulky, and while there was about 35% of it on the charge by weight, there was over 50% of it by bulk, not including slag and coke. In feeding, therefore, it was a difficult matter to mix the whole of it with the charge. Several different ways of feeding the furnace were tried. The one giving the most satisfactory results was to feed nearly all of the residue along the center of the furnace, in connection with the lime-rock, coarse ore, and coarse iron ore, and the fine and easy smelting ores along the sides. The slag spread uniformly over the whole furnace, favoring the sides with the coke. The charge would drop several inches at a time, going down a little faster in the center than on the sides.

It is possible that a small proportion of the residue in connection with the easy smelting, leady, neutral ore, iron ore and lime-rock formed the type of slag marked No. 1.

	SiO_2	FeO	MnO	CaO	ZnO	Pb	Ag
1	33.7	34.1	1.0	16.5	7.5	0.9	0.7
2	31.0	36.1	1.2	16.0	9.6	1.3	...

This being tapped with a good flow of slag, the charge would drop, bringing a proportionately large amount of residue in the fusion zone which formed the type of slag marked No. 2. There was also a marked variation in the slag shells from different pots. The above cited irregularities of course exist to a certain extent in any blast furnace.

I believe that, in smelting residues high in zinc oxide, better metallurgical results would be obtained by using a dry silicious ore in connection with a high-grade galena ore, provided the residue be low in sulphur. This was confirmed to a certain degree in actual practice, as the furnace worked very well upon increasing the percentage of Cripple Creek ore on the charge. This would also seem to indicate that alumina had no bad effect on a zincy slag.

AVERAGE ANALYSIS OF MATERIALS SMELTED.

Name—	SiO_2	FeO	CaO	MgO	ZnO	Al_2O_3	Fe_2O_3	S	Pb	Cu	Ag	Au
Mo. iron ore	10.0	65.0										
Lime rock	1.5		52.0									
Mo. galena	1.5	2.4			9.5			11.0	74.0			
Av. of beds	50.8	16.2			4.6			3.3	9.1			
Residue*	10.5	38.5			18.0			4.8	2.2	1.0	10.0	0.03
Roasted matte‡	9.0	48.0	3.0		10.0			4.0	9.9	3.0	21.0	0.06
Barrings	18.8	24.4	5.0		14.5			6.0	25.4		13.0	0.07
Coke Ash	27.0		14.9	4.5		19.7	31.6					
	H_2O	V.M.	F.C.	Ash	S							
Coke†	1.2	2.3	85.7	11.1	0.9							

*Much better work is being done at present smelting the western zinc ores, and the residue contains about one-third of the above figure, or 7.5% of zinc oxide. The high per cent. of ZnO left in residue was mainly due to poor roasting.

†There was also considerable coke used of an inferior grade, made from Kansas coal.

‡Part of the ZnO in roasted matte came from being roasted in the same furnace the zinc ore had been roasted in.

ANALYSIS OF BULLION, SLAG AND MATTE PRODUCED.

	Bullion		Slag							Matte			
	Ag	Au	SiO_2	FeO	MnO	CaO	ZnO	Pb	Ag	Ag	Au	Pb	Cu
Feb.	90.0	1.15	31.2	35.9	1.0	14.5	10.3	0.88	0.98	19.0	0.04	8.7	1.5
March	93.1	1.63	31.3	37.2	1.0	13.9	11.1	0.71	1.30	21.0	0.06	8.0	2.5
April	104.3	1.59	29.8	37.7	2.7	13.9	11.4	0.52	1.40	23.0	0.07	7.0	3.5
May	90.0	1.24	30.0	37.3	2.2	14.1	9.3	0.86	1.10	25.4	0.07	5.1	4.0
July	78.7	1.00	32.2	37.4	1.0	13.9	9.8	0.50	1.15	21.3	0.03	8.9	4.0
Aug.	90.8	1.21	31.2	37.1	1.7	13.7	9.6	1.10	1.60	23.1	0.08	9.8	3.0
Sept.	65.3	2.58	32.0	39.7	0.8	14.9	8.1	0.80	1.30	18.6	0.06	7.6	2.3
Average	87.5	1.49	31.1	37.5	1.5	14.1	10.0	0.77	1.26	21.6	0.06	7.8	3.0

MONTHLY RECORD OF FURNACE OPERATIONS

	Blast ounces	Tons per F. D.	Per cent. Pb on charge	Per cent. coke on charge	Per cent. slag on charge	Per cent. S on charge	Matte produced	Saving Ag	Saving Au	Saving Pb
February	21	42.5	9.0	12.0	30.0	3.7	8.0	84.4	83.0	90.3
March	21	44.8	9.7	13.5	37.0	4.0	9.0			
April	21	43.7	9.0	13.5	35.0	4.3	10.0	97.9	70.5	96.6
May	21	49.4	10.0	13.5	30.0	3.5	6.5	95.6	109.5	88.8
July	17	41.0	9.8	12.5	34.0	3.8	6.0	97.9	90.0	92.9
August	18	47.0	9.3	13.0	32.0	3.7	6.3	86.2	107.5	87.6
September*	15	51.0	7.3	13.0	30.0	2.8	4.6	92.9	94.0	95.6
Average		45.6	9.1	13.0	32.6	3.7	7.2	90.8	92.4	92.0

*There was less residue on the charges during this month, which accounts for the larger tonnage with a lower blast.

*Abstract of a paper in *Western Chemist and Metallurgist*, I, VII. Aug. 1905.

December 7 the first electrically-equipped spinning mill in England was opened. It is located at Pendlebury, Manchester.

A rule for main bearings, said to have been followed by Edwin Reynolds, is that the product of the square root of the speed in feet per second and the pressure per square inch of projected area should not exceed 500 for vertical engines, and 350 to 375 for horizontals.

Mill Experiences.

BY R. D. O. JOHNSON.*

Wear on all the parts of a concentrating mill, due to the flow of the material treated, is the prime source of repairs and expense. Pipes, troughs, and launders conveying material no harder than crushed limestone are worn out in an incredibly short time. The wear is greatest at points where a direction of flow is changed.

The troughs conveying the tailings from the mill of the Central Lead Company, at Flat River, Mo., were made of 2 in. oak and had to be extensively repaired every week. The wear was confined almost entirely to the bottom, the sides of the troughs being but little damaged.

I experimented on various materials for lining troughs, including cast iron, steel, vitrified pipe and plate glass. The last, contrary to all expectations proved to be the poorest of the lot. A plate of glass 5/8 in. thick was placed under a stream of water carrying about 20% by weight of lime-stone crushed to 8 mm. This mixture flowed down a 3 in. angle iron, with an inclination of 45 degrees, from an elevation of 5 ft. above the point of delivery. The plate was perforated in 70 min., the hole being oval in shape 1½ in. long and ¾ in. across the widest part.

The wear on pieces of vitrified pipe, cast-iron and steel was of a very different character, being less concentrated. There was a small depression under the point of impact, with grooves radiating from it to the edges of the piece.

At points where the direction of flow was sharply turned; or at points of impact, as at the point where the feed is delivered to a jig, or the fall of the tailing stream from jigs into the tailing trough, it was found that wear could be entirely prevented without the employment of any tension to the troughs themselves. Their treatment is shown in Fig. 2. Each of the riffles *a*, was faced on the up-stream side with a strip of any kind of scrap sheet-metal. In this case, the scrap perforated metal of the worn out trommels was used. The riffles were made up individually of ¾ in. edging strips, shown in Fig. 3. They were merely set in on the bottom of the trough, the side strips *b* being nailed in. The spaces or pockets between the riffles fill up, and the new bottom thus produced is but little rougher than that of the trough without the device. A fall of one in twenty was sufficient to carry 8 mm.

Fig. 1

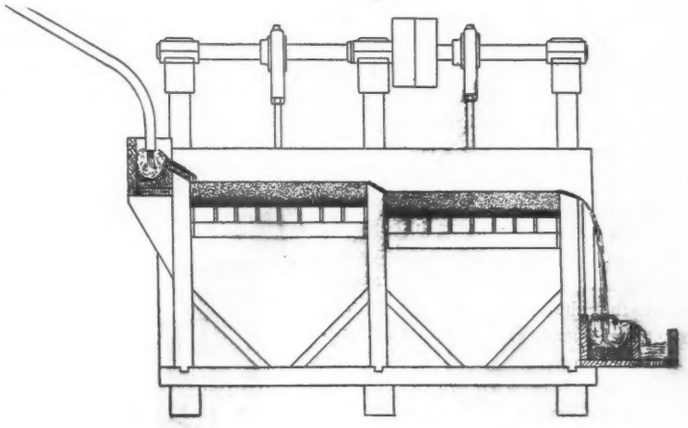


Fig. 4

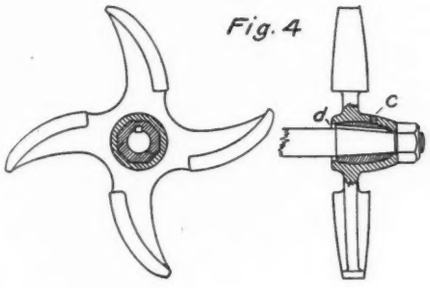


Fig. 5

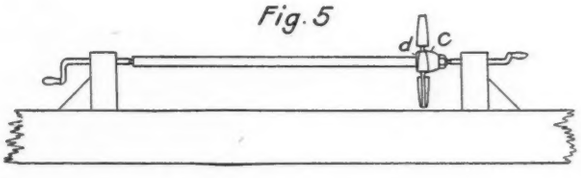


Fig. 2

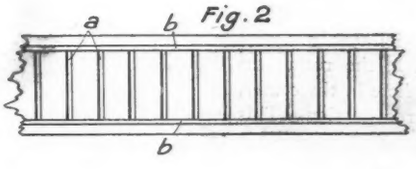
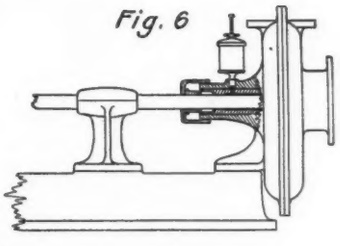


Fig. 6



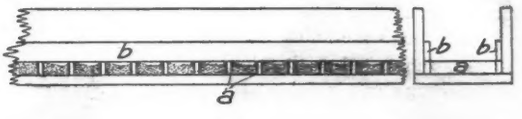


Fig. 3

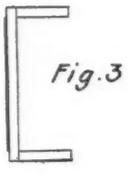
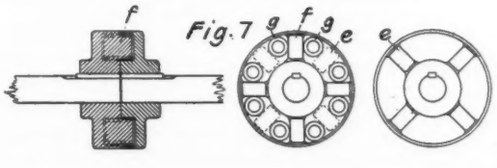


Fig. 7



*Consulting mining and mechanical engineer, Denver, Colo.

material over those riffles without clogging. The edges of the sheet metal facing on the riffles was the only part presented to wear, excepting the side strips *b*, which were subject to but little erosion. After the troughs were fitted with these riffles, repairs ceased for a year, At the end of this time, the repairs then consisted of replacing some worn riffles and putting in new side strips.

The problem of diminishing the excessive wear on the rotors and linings of centrifugal pumps handling this coarse material was more difficult of solution. The pumps originally purchased were made by the Lake Superior Iron Works, of Hancock, Mich. The rotors were made of a good quality of gray iron, chilled on the propelling surfaces. The centers were soft and were machined to fit the tapered end of the shaft. This was fitted with a feather and the rotors contained a corresponding seat. The nut on the extended end of the shaft held the rotor firmly against the taper. The pump linings were of ordinary cast iron, not chilled. These linings and rotors were worn out with such rapidity that the case required immediate attention. After numerous trials and frequent modification of the pattern, the shells were successfully cast in white iron. The casting of the rotors in this material presented more difficulties on account of the impossibility of machining it. As shown in Fig. 4, the rotor was cast with a keg-shaped hole in the center, having an octagonal cross-section. This hole was cast large enough to receive the tapered end of the shaft with its feather, but was nearly a fit at the small end of the taper near the nut. The hole marked *c*, was cored out through the hub.

The rotor was mounted on its shaft as follows: The rough cast rotor was slipped over the tapered end, the nut nearly made up and the whole placed in a rough home made centering lathe, shown in Fig. 5. Blunt pine wedges were put in loosely at *d*, and driven up until, by turning the shaft on the centers, the arms of the rotor were found to run true. The spaces between the wedges were then closed with clay and hard babbitt metal was poured in through the hole *c*, so that the space about the shaft and feather was completely filled. When cool, the nut was brought up firmly against the end of the rotor and the job was done. This work was done by unskilled labor and cost 5c. for each rotor cast on. The babbitt was subsequently recovered from the worn out rotors by heating. It cost 57c. each to bore, ream and cut the key seats in the chilled iron rotors. These would frequently wear out in three days. The white iron rotors usually lasted three weeks. The chilled iron rotors had the added disadvantage of wearing very unevenly and getting badly out of balance. This produced great vibration and consequent wear on the shafts. This wear diminished very much with the use of the white iron rotors, which wore much more evenly.

The wear of the shafts was bad at best and was due, in a measure, to grit getting in between the shaft and casing sleeve. Though a supply of fresh water was tapped in and was expected to flow around the shaft into the pump and keep out grit, the wear still continued. The water pipe was disconnected and into the hole where it had entered, was screwed a large Powell grease cup. This was filled with a tarry mixture composed of rosin dissolved in hot linseed oil. This compound was made up rather stiff and was fed by light pressure into the space between the shaft and the casing sleeve. The space was completely filled and this effectually prevented the entrance of grit. The mixture escapes gradually into the pump and is carried off by the current. The position of the grease cup is shown in Fig. 6.

High current velocities are, of course, necessary in the discharge pipes of centrifugal pumps. Pipe are more apt to be too large than too small. Pumps that have been giving trouble in choking have been relieved by using smaller pipes. No fittings except couplings and flange unions should be used on the discharge. Where the sections of pipe are joined, the ends should be turned square in a lathe and the threads cut far enough to allow the squared ends to abut when screwed up. Any obstructions such as would be created by a space between the ends of the sections will deflect the current and produce unnecessary wear, not only at the joint, but also beyond.

The bends should be long and easy, and, if possible, the pipe should not have an angle of less than 30 deg. from the horizontal The requirements may be relaxed as the material to be pumped decreases in size of grain.

Wherever it is possible to drive centrifugal pumps with direct connected enclosed motors in place of belts, it is desirable to do so. Belts for centrifugal pumps have to be of much greater width than would be required to convey the power consumed by the pump. This is necessary to give the requisite driving contact on the small pulley on the pump shaft. It is almost always necessary that the belt be of rubber, on account of the location of the pump (usually in a wet pit), and the danger of leakage. The belts usually run in or near a vertical position, hence must be tight to secure driving adhesion. The high speed of the pump shaft and the necessary pull and tightness of the belt, make plenty of lubricating oil necessary in the bearings. Mill attendants have yet to establish a reputation for economy in oil, particularly when the boxs "run hot."

A portion of this excess of lubricating oil naturally finds lodgement on the rubber belt. The combination is not economical, as the rubber manufacturers and experience teach. The difference in size of the driving and receiving pulleys, particularly the small size of the latter and the sharp and quick bending, greatly diminishes the life of the belt. All of these conditions contribute to short life. The cost for centrifugal pump belts is generally a formidable item in mill repairs.

Direct connection with electric motors greatly diminishes trouble and cost of repairs, though it introduces troubles of its own. Motors do not endure a great amount of vibration, and vibration is the invariable accompaniment of the uneven wear of the rotor. The motor may be protected in a measure, by introducing between the motor and the pump shafts the coupling shown in Fig. 7. This consists of two cup-shaped parts, provided with lugs *e* and *f*, that interlock, as shown, when keyed to the shafts and brought together. Between these interlocking lugs, are placed the short sections of rubber hose *g*. This coupling can be used only with pumps having independent bearings on the pump shaft. It was used with success on the double suction 2½ in. "Chatts" pump manufactured by the Kingsford Machine Company, of Oswego, N. Y. This coupling also obviates the necessity of very close alignment of the bearings of the motor and pump.

Armature insulation suffers from the metallic dust of concentrating mills. Even where there is no appreciable amount of dust, it makes its appearance on the moving parts of electrical machinery. Unless the enclosed type of motor is used, the armature becomes coated with it. Small cracks or abrasions in the insulation that ordinarily would be of no importance, become fruitful sources of short circuiting and "burn outs" in the presence of this dust. This is particularly true if the dust contains a considerable portion of galena, as it does in the mills of the southeastern Missouri.

Grinding Pans.

Owing to the success attending the use of grinding pans in Australia, for the purpose of fine grinding, experiments are being conducted in the Transvaal with the object of substituting them for tube mills, a proceeding which is advocated by many former believers in tube mill practice. It is believed that five pans should do the same work as one 16-ft. tube mill, the cost of the latter being at least £1,000, as against £400 for grinding pans of equivalent capacity. Grinding pans are also considered to be more easily repaired and reinstalled, and the following advantages are also claimed for the pans: (1) more easily accessible; (2) more easily handled; (3) the possibility of internal amalgamation.

Certain vegetable acids are added to electrolytes to obtain better deposition.

Systematic Timbering at Emley Moor Collieries.*

BY H. BADDILEY.

Systematic timbering is a subject that every colliery manager and every colliery official should consider seriously, in the endeavor to reduce the number of accidents from falls of roof and side, until they have established at their collieries the system of timbering that would best suit each particular seam or district under their charge. It is the duty of colliery managers to educate their officials, and they again, with the help of the former, should endeavor to educate the miners. After three years' experience I feel sure that this can be done. I have been hammering away at my men for the past three years, and am highly satisfied with the progress that has been made; great credit is due to the miners for the way in which they have fallen in with the improved system of timbering.

Wheatley Lime Coal-seam.—For the purpose of explaining more fully the system of timbering in the Wheatley Lime coal-seam, under my charge, sketches have been prepared, showing the systems adopted where coal-cutting machines are used, and where the coal is got by hand-labor.

Machine-faces.—In the machine-faces (Fig. 1.), two rows of props, *A* and *B*, only are left along the face, after the coal has been filled away (Fig. 2). A third row, *C*, is set behind the machine as soon as the coal has been under-cut (Fig. 3), and as the coal is filled away the filler sets another row, *D*, about 2 ft. from the last one, *C* (Fig. 4). The two back rows, *A* and *B*, are then drawn out, leaving only the two rows, *C* and *D*, next to the face, about 2 ft. apart. The distance from prop to prop along the face varies from 2 to 2½ ft. The rows of props are set perfectly straight. As an instance, not long ago, measurements were taken in a face 675 ft. long: (1) the distance, from the coal-face to the first row of props, varied from 3½ to 4 ft., the number of props set being 280; (2) from the first to the second row, the distance varied from 2 to 2½ ft., the number of props set in this row being 136; and (3) in no case, along the face, was a prop found more than 6 in. out of a straight line. It was possible to set a mining dial at one end of this face, and take a bearing to the other end, 675 ft. distant. This face had traveled over 1,500 ft. by machine-work, and was advancing at the rate of 16½ ft. per week.

Previous to introducing this systematic method of timbering, the props were set in a rather irregular manner; the roof, being composed of strong bind, came on in very heavy weights, breaking the straggling props one by one, and finally came in along the face. Wood chocks were tried with better results, but as they proved rather expensive, the system of setting two rows of props close together in a straight line was tried. With double the number of props in the row, the roof now breaks off in a straight line, close behind the back row of props, and there is not half the trouble with the face falling in; in fact, it is almost a thing of the past, and very few chocks are now set.

Hand-worked Face.—The system (Fig. 5,) in the hand-work places is somewhat similar to that in the machine-faces, except that a row of props, *C*, 5 ft. apart, is set along the face, close to the coal, before the coal is holed (Fig. 6), and two intermediate props are set between them after the holing is done and before the sprags, *D*, are drawn (Fig. 7).

New Hards or Silkstone Coal-seam.—The Silkstone coal-seam, 80 ft. above the Wheatley Lime coal-seam, is worked mostly by shallow-cut machines, and the system of timbering is not quite the same as in the seam below. The roof being composed of a softer bind is broken off much more easily; and the seam, being thin, varying from 1½ to 2 ft. in thickness, is packed solid in the goaf, with the holing and ripping dirt. In this case, only one row of props is left to support the roof, after the coal has been filled away, but another row is set, as the holing is done. The props are set in a straight line, the rows are placed 3½ ft. apart, and the distance from prop to prop in any row does not exceed 3 ft.

Blocking Coal-seam.—This seam, 120 ft. below the Wheatley Lime coal-seam is also a thin seam (coal, 20 in. and bottom-dirt, 6 to 8 in.) with a thick roof, composed of alternating layers of strong bind and sandstone. It is worked by coal-cutting machines. The system of timbering is similar to that adopted in the New Hards coal-seam. An ample supply of lids is sent daily to the working-faces, no prop being set without a lid. The lids are 12 to 18 in. long, 3 to 6 in. wide, and 2 in. thick. The lids save the props, and allow them to be more easily withdrawn.

Barnsley Soft or Warren House Coal-seam.—I have charge of a small colliery working this seam, and until about 2½ years ago it was worked on the board-and-pillar method, because I was given to understand that the roof was too tender for the longwall method. However, I adopted the longwall method, although the work-

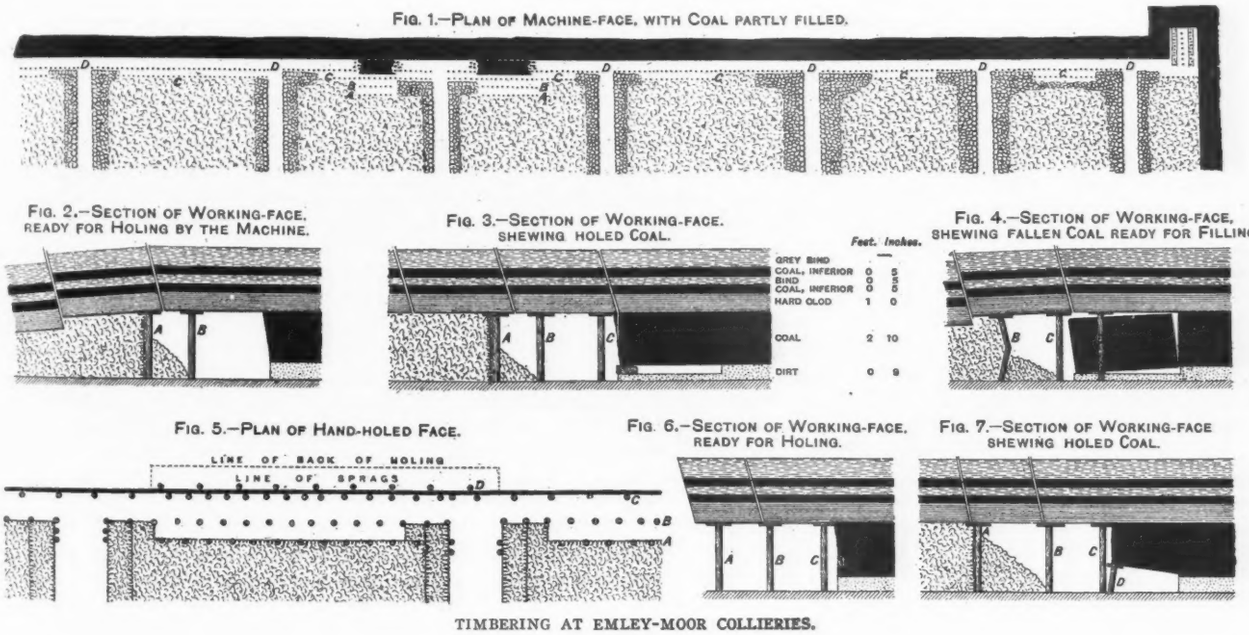


Fig. 1.—Plan of Machine-face, with Coal partly filled.
Fig. 2.—Section of Working-face, ready for Holing by the Machine.
Fig. 3.—Section of Working-face, shewing holed Coal.
Feet. Inches.
GREY BIND
COAL, INFERIOR 0 5
BIND 0 5
COAL, INFERIOR 0 6
HARD CLOD 1 0
COAL 2 10
DIRT 0 9
Fig. 4.—Section of Working-face, shewing fallen Coal ready for Filling.
Fig. 5.—Plan of Hand-holed Face.
LINE OF BACK OF HOLING
LINE OF SPRAGS
Fig. 6.—Section of Working-face, ready for Holing.
Fig. 7.—Section of Working-face shewing holed Coal.

TIMBERING AT EMLEY-MOOR COLLIERIES.

* A paper read at a meeting of the Institution of Mining Engineers at Leeds, 1905.

men said that the face would be closed in less than one month; and when the first big weight came on, the men came out, remarking that the face was finished, and that everything would be buried. However, very little damage was done, and the same face is still working.

This seam is worked by hand-labor. The section varies from 4½ to 5 ft. of dirt and coal. The roof is composed of rather soft gray bind. Two rows of props are set along the face, 3 ft. apart, and the distance from prop to prop is 2½ ft. Another or third row is set close to the coal, and the distance from prop to prop is about 5 ft. This row is set before the men begin to hole the coal; and, when the holing is done, intermediate props are set. Hard-wood lids are used in this seam, 18 to 24 in. long, 6 in. wide and 1½ in. thick, and they obtain a good hold of the rather soft roof. The seam works well on the longwall system, and the roof gives but little trouble.

Conclusion—I feel sure that, if the workmen are taught to set timber in a systematic way, and a strict supervision is kept over them by the officials, the number of accidents from falls of roof can be materially reduced.

The Bullfrog Mining District.*

BY H. H. TAFT.†

At the head of the Amargosa desert the Grapevine range, 3,000 ft. above the valley east and 7,000 ft. above Death valley west, is flanked east by recent volcanic tuffs. Along the summit occur limestones and quartzites dipping east, and a lime-conglomerate, carrying granite, diorite and quartz, such as occur many miles north.

The Amargosa range, lying between the south end of the Ralston desert and the northwest end of the Amargosa, is formed by series of tuffs superimposed upon limestone. The various members of the volcanic series occur with the regularity of sedimentary strata, and the upper ones are highly colored. They dip from 10° to 20° NE. An extensive block-faulting has exposed the edges of the various flows, particularly from the west, the escarpment being on that side. About 2 miles west of the Bullfrog mine is a small hill of gneiss, overlain by strata of chloritic slates, quartzites, limestones, and tuffs, dipping flat to the east.

On August 10, 1904, two claims were located as Bullfrog No. 1 and No. 2. From August 10 to September 14, 1904, a large number of claims were located on what are now known as Ladd and Bonanza mountains, about 3 or 4 miles SE.

The Bullfrog Mining Co. was formed to take up a group of Ladd mountain claims; and later, the first discovery of the district was transferred to a new corporation, The Original Bullfrog Mining Syndicate. A mile south of the original Bullfrog property some claims were staked off, surveyed and sold as lots under the name of "Bullfrogtown." Amargosa, a mile further south, aspired to be the metropolis. Out on the desert west of Ladd mountain the same thing was done; and the "town" was named Bonanza. Four miles from the latter place, in the Oasis valley, on the bank of a stream of running water the town of Beatty, named for a ranchman living a mile above, was laid out, and soon became the most populous place. Three miles below Beatty a group of tents bore the name of Gold Center. In March, 1905, in a cove made by the desert in the Amargosa mountain, between Bonanzo and Ladd mountains, Rhyolite was laid out, and Bullfrog and Bonanza moved to it. This place is 5 miles from water.

About 10 miles SW. of where Oasis valley breaks through the Amargosa range, the cliffs are of limestone which pitches west and is soon buried beneath the soil and the volcanic tuffs that have probably borne it down. In several places the contact is exposed and there are evidences of a flow of water not accompanied by a siliceous deposition, except in and near the Bullfrog claims. Between Ladd mountain and the Oasis creek there is a place where there has been a considerable spring on the contact. Boulders of granite of 3 in. diameter are scattered over an area 100 ft. square. There is no silcification and no mineral. The Bullfrog claims cover an immense outcrop that can be seen for miles, and are only 3 miles from a spring that has been frequented by prospectors for 30 years or more. The white quartz lies like a crescent around a small dome-shaped hill, following the contact which dips 30° N. 60° W. into the hill. This quartz has a maximum thickness of nearly 100 ft. and is generally massive, though sometimes there are large slightly amethystine-tinted crystals with a conchoidal base. A later cracking has occurred and a flow of water depositing copper sulphides and the precious metals. Wherever a green stain occurs visible gold can usually be found.

The other properties of this district are entirely different, resembling somewhat those of Goldfield. There has been a nearly vertical fissuring, followed by a flow of water heavily charged with silica, filling the fissures and soaking into the country-rock. One can find all gradations from pure quartz to slightly silicified country-rock. These are the so-called rhyolite dikes. The country-rock itself had a slight mineralization, which this silicification did not increase. A secondary and much less extensive cracking and inflow of siliceous waters occurred, which deposited the gold. The veins are nearly vertical, strike N. 10° to 30° E., are sometimes thin seams, sometimes several feet in thickness, and again wide zones of stockwerk. The better formed are calcareous and slightly stained with manganese. There are many of these veins and they were easily found; but to discover ore-shoots in them is quite a different matter. The amount of work done in both this district and Goldfield during the past winter has been remarkably small.

An interesting and, to the prospector, a very important phenomenon is the covering of these veins. The older tuffs are mineralized and the more recent (upper) are not; the older are basic, while in the upper there is a flow of rhyolite. At Tonopah it is quite noticeable that the rhyolite is more recent than the "mineralized porphyry." The regularity of the eruptions and the exposure of the edges of the often highly colored strata make this an ideal place to study this phenomenon.

Funeral Range.

The Grapevine and Funeral ranges are practically the same. Old-timers do not agree as to the dividing line. With the mountains south, they form the eastern boundary of Death valley. There has been much searching in this range for the lost Breifogle mine, one of the romances of the desert. Except in one place, both ranges are poor prospecting-ground. The general formation is quartzite and limestone overlain by immense deposits of recent conglomerate. In the north end of the Funeral range there is a development of green shales, identified elsewhere as Cambrian. These shales usually carry white glassy quartz, which is rarely mineralized; but in this case there are ore-shoots, carrying sufficient gold to make the district attractive if wood and water were more available. One property in this district has recently been thoroughly developed under bond.

To the south the range ends abruptly, near where the wagon-road from Ash Meadows to Furnace creek crosses. The division along the dry water-courses followed by this road is remarkable; they have large boulders of quartzites and limestone north, and on the other side black and brown lava. South, the topography is broken and mountainous, but not in a distinct range. The Green mountain still farther SW. is another field for prospectors. One small stamp-mill is running at the foot of this mountain on the Death valley side. Still farther south the drainage of the Amargosa cuts through into the Death valley.

A convenient rule for approximately determining the relation between the diameter and circumference of a circle is to multiply the diameter by 22 and divide by 7 to obtain the approximate circumference. Conversely, multiply the circumference by 7 and divide by 22 to ascertain the diameter.

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* From advance proofs (subject to revision) of the *Transactions* of the American Institute of Mining Engineers.

† Mining engineer, Denver, Colo.

Rock-Drill Operation.*

BY WAGER BRADFORD.

Of great importance in the operation of rock drills is the question of maintenance. No motor is subjected to such hard usage, both from the nature of its work and the carelessness of the men who run it. A good man, taking a pride in his work, will keep a machine in use for months, where a careless man would send it up for repairs weekly. In my opinion, the bill for maintenance could be cut in two if men were charged for every spare part they took out.

I would supply each machine man with a drill in good order and then make him pay for every spare, increasing the price per fathom, to cover reasonable wear and tear. Steel I would deal with in the same way. The necessity of plenty of drills is urged, and I agree with the argument, but in most cases there would be steel enough and to spare if the men looked after it. There is not a big mine on the Rand in which tons of steel are not buried. Drills are thrown down the stopes at random—may reach the level and may not—and the miner does not trouble much either way, because they cost him nothing.

If every man had issued to him a set of bits when he started and had to account for these when he left and to pay for any required over the set and for all drills sharpened, the steel bill would come down with a run. Instead of relying on a few men to "boss up" the drills underground, every man who used drills would become at once a boss, looking after his own, and he would keep a sharp lookout that his drills were in good order, well sharpened, and gathered into safe places as soon as used; that waste was reduced to a minimum, and that sharp bits were not sent back to the shop, etc.

But while we may effect economies in power, and maintenance and stores, the great saving must be in the labor employed; not by reducing the wages of the rock-drill man, but by increasing his efficiency. It is the man behind the drill who counts, but the degree to which he counts may be modified by adopting a different system of stoping. Men fail to break ground efficiently, not because they are unwilling, but because they do not know how. It is easy to train a man to run a machine and bore holes; it is difficult to train him to break the maximum tonnage, with its minimum quantity of explosives.

The latter art makes the miner, and it requires long experience and good judgment of ground. The demand for such men might be partly met by dividing the work of rock drilling into two classes: the first to lay out and blast the holes, and the second to bore them.

The man behind the drill would thus be responsible solely for getting down the holes pointed out to him, as many as he could per shift, and he would be paid at so much per foot, or per fathom, and as he would not handle explosives, his whole time would be devoted to drilling.

He need not be a skilled miner to do this, but he would have to know all about operating a rock drill. The men of the other class would be experienced all-round miners, selected on account of their ability to break ground, and to economize in explosives. Each would be in charge of a certain section of the mine, and his duty would be to visit the stopes under him twice daily, to study the ground and pitch the holes, so as to get the greatest possible burden.

In the afternoon the same man would charge and blast such holes in his section as he deemed advantageous, aiming to economize in explosives. He would be on a regular salary, with a bonus for fathoms broken, to be shared with the rock-drill man. Such a system would not affect the wages of miners, except for the better, and would by degrees train indifferent machine men into first-class miners; but it probably would not be introduced without strenuous objections on the part of the miners. Yet it is certain that a system on these lines would very greatly increase the rock-drill duty on the Rand, and reduce costs in proportion.

* Abstract of discussion in *Journ.* Chem., Met., and Mining Soc. of So. Africa, Nov. 1905, p. 164.

Magnesite Deposits of California.

The market for domestic magnesite may be influenced by a factory for magnesite brick which has recently been erected at East Oakland, Cal. It is as a material for lining cement kilns and smelting furnaces which carry basic slags that magnesite finds its most important use. The magnesite brick made in this country have been manufactured in Pennsylvania out of magnesite imported from Greece or Austria, which has been cheaper than magnesite brought across the country from California. The manufacturers of steel in Pennsylvania may now find it cheaper to transport the California brick than to buy brick made in Pennsylvania from imported magnesite.

Nearly all the magnesite known in the United States is found in a belt of serpentine that extends from Southern California along the coast range to Oregon. Four of these deposits were examined by Frank L. Hess of the Geological Survey.

The first was in the northeast of Santa Clara county, 32 miles southeast of Livermore. Here a large amount of money has recently been spent. Several veins have been opened by open cuts and tunnels. The magnesite is transported a half mile over an aerial tramway to bins and thence by traction engines and iron wagons to Livermore. The wagons contain 17½ tons each. The production is 100 tons per day.

Near Portersville, in Tulare county, 275 miles southeast of San Francisco, lies the second magnesite deposit. The mines are only 4 miles from Portersville on a down-grade road, so that haulage does not add much to the expense of production. The mines, which are worked by tunnels and open cuts, are operated by the Willamette Pulp and Paper Company, of San Francisco. Nearly all the magnesite produced here is burned at the mines with fuel oil. The burned residue—magnesia—which is used by paper mills for digesting and whitening wood pulp, is shipped to Oregon City, Ore.

The small portion of magnesite not burned is used in its raw state by the Western Carbonic Acid Gas Company of San Francisco, for the manufacture of liquid carbonic in its plant at Sedan.

At Chiles Valley in Napa county, are old magnesite deposits which were worked for 12 years but are now idle. These are owned by the same ones that control the Portersville deposits. The magnesite here is less pure and the haul is longer, so that there is no reason for operating these deposits at present.

From the Walters deposits in Pope Valley, Napa county, to Rutherford, the nearest station on the Southern Pacific Railway, is 22 miles. Although the magnesite here is good, the deposits are not worked. They have recently changed hands, and, with the chance for a new electric road in this locality, the deposits may possibly be developed in the near future.

Magnesite is used not only as an ingredient of magnesite brick, but also in the manufacture of carbon dioxide and in the manufacture of paper from wood pulp. The carbon dioxide is liquefied and shipped in steel cylinders to all the Pacific Coast and Southwestern States, where it is used for soda-water fountains, and for refrigerating machines. In the manufacture of paper, magnesite is transformed into sulphite of magnesia and used as a digester for the wood pulp. Small amounts of magnesium chloride are used in cement. Combined with asbestos, magnesite is also employed as a lagging in steam-pipe casings.

The economy of small machine drills is doubtful in the opinion of many experienced engineers. "Whenever I have tried them on steady work," says W. Bradford, "they have proved unsatisfactory, both in upkeep and boring power. In a test run, where conditions were good and the drill new, I have done 56 ft. with one machine on one shift, and later on have found it difficult to get 15 ft. for a day's average."

The Ontario Geological Department is to investigate the reported discovery of diamonds and garnets a few miles north of Sault Ste. Marie.

Banning No. 2 Mine.

(EDITORIAL CORRESPONDENCE.)

The Pittsburgh Coal Company's Banning No. 2 mine is on the west bank of the Youghiogheny river and on the Pittsburgh & Lake Erie Railroad, 43 miles south from Pittsburg.

It ships over 3,000 tons per day, but the haulage system is now being lengthened and development is under way, to enlarge this output.

The Pittsburg seam in this region attains its thickest development yet attacked, 8 ft. being the customary face removed. It is composed of breast coal, 5.46 ft.; bearing-in coal, 0.24 ft. bounded by a 0.02-ft. clay binder on each side; upper bottom coal, 1.09 ft.; lower bottom coal, 1.29 ft. The draw slate on top is 1 ft. thick and is surmounted by 1 ft. of roof coal, which is succeeded by alternating bands of coal and slate until the barren roof rocks are met. The draw slate is taken down and the roof coal left in place. The floor is limestone, fireclay being almost totally absent.

Electricity is the motive power for the mine. The generating station contains two General Electric Company's 575-volt, 261-ampere dynamos, driven by Harrisburg standard engines, and one National Eelectric Company's 575-volt, 522-ampere dynamo, driven by a Buckeye engine. One General Electric and the National generator run during the day, and the other General Electric at night. These supply light and power for other neighboring mines as well.

The fan, Fig. 1, is a 16 x 8-ft. Capell, driven by a Chambersburg engine at 90 r. p. m., at which speed it maintains a pressure of 2 in. of water, and exhausts 153,000 cu. ft. of air per minute. The mine is gaseous and safety lamps are required in working places. Shooting off the solid is forbidden. Airways are large, and all permanent stoppings are built of brick.

The coal dips at about 2 deg. to a little north of west, the butt cleat having the direction N. 70 deg. W. The main entries, driven in quadruple, go due west, oblique to both cleat and dip. From these, triple face entries are turned, at intervals of 1,200 ft. with a deflection angle to the left of 69 deg., so that they secure a grade of 1 per cent. in favor of the loads. From the face entries, double butt entries, spaced 480 ft. apart, are turned at right angles in both directions, to dip and rise. The dipping and the rising butts, however, are not opposite each other. A 50-ft. chain pillar is left between butt headings. Rooms, 24 ft. wide, are turned from both butt headings, spaced 39 ft. centers. The room necks, 9 ft. wide, are continued for 30 ft., and then widened squarely to 24 ft. After the rooms have met midway between butts, the 15 ft. pillars are drawn by hand picking. Electrically driven, Jeffrey, 7-ft. undercutting machines, with flat bits, are used for driving and widening the rooms. Owing to the relative wideness of the rooms, the pillar coal can not be secured in large pieces; it is, however, readily sold to the users of fine coal, and part of it is coked.

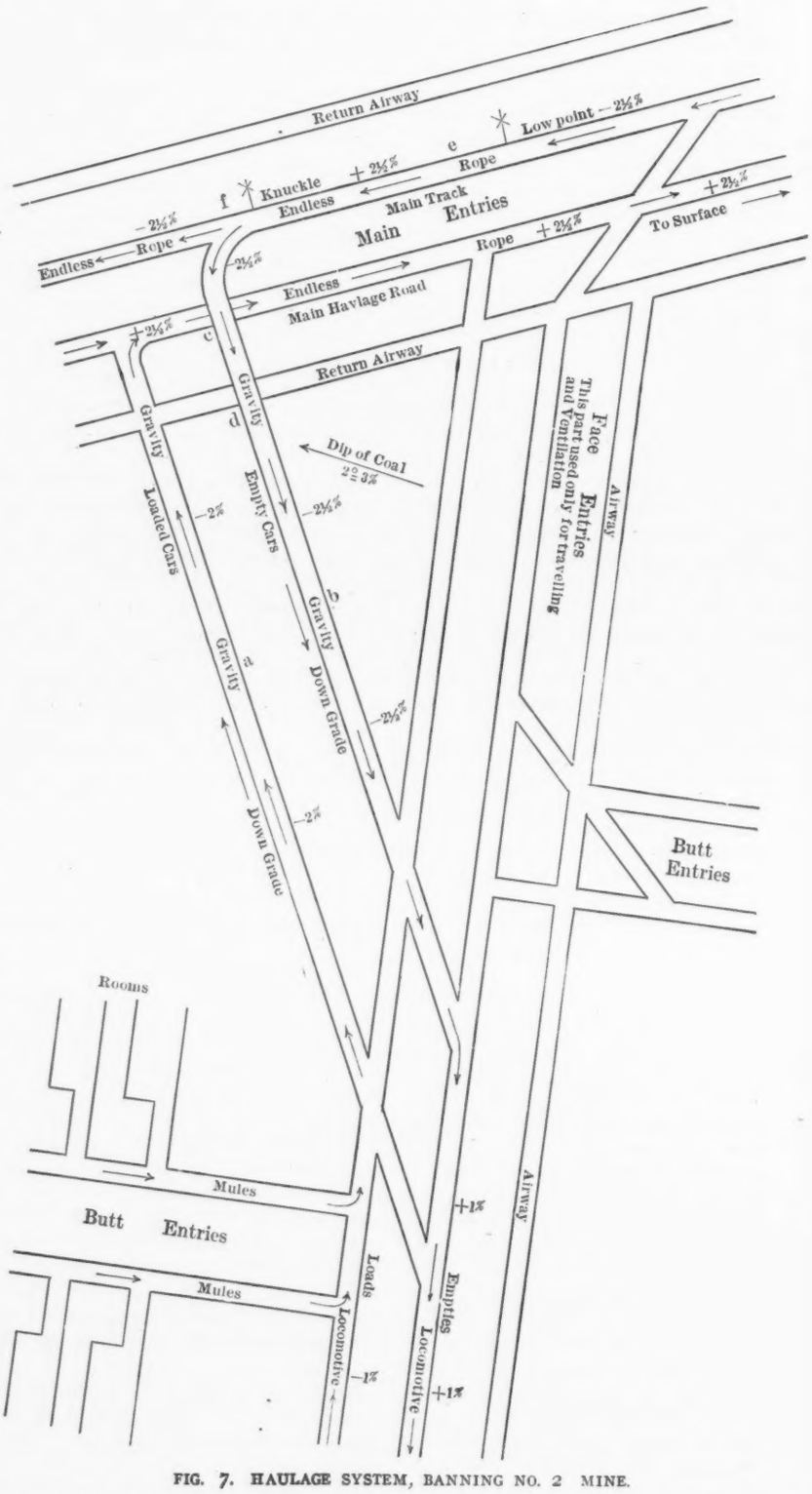

FIG. 7. HAULAGE SYSTEM, BANNING NO. 2 MINE.

The unique feature of this mine is its haulage system. An endless rope, aided by carefully adjusted grades, permits the maximum untilization of gravity, and the entire abolition of manual labor. The car carries 2¾ tons of run-of-mine coal and itself weighs about 1 ton. It is provided with brakes. The main and face entries are laid with 45-lb., and the butts with 16-lb. rail; gauge is 40 in. Mules draw the loads to the face entry; a General Electric, 14-

ton locomotive then collects them into trips of 30 or 40 and takes them to the main entry. Here they are attached, three at a time, to the up-going side of the endless rope by a clutch, one of which is shown in Fig. 2. This clutch is clamped to the rope by a hand screw, and coupled to the car by a draw pin. From the high point of the tipple, they run by gravity to the Phillips dumps, and back again, to be clamped, in groups of three, to the down-going rope. Fig. 3 is a general view of the tipple.

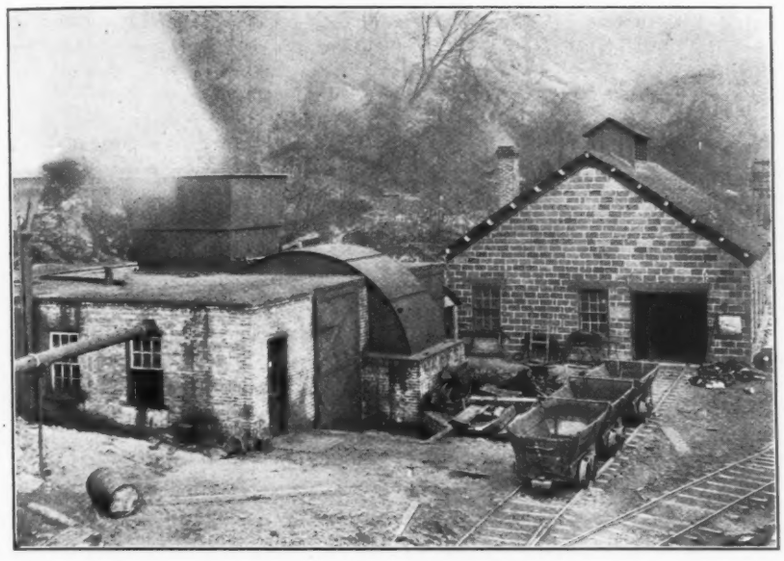

FIG. 1. FAN AND SHOP.

This endless rope, 10,000 ft. long, is 1¼-in. steel, lang lay. Its driving engine, shown in Figs. 4 and 5 consists of a pair of Millholland 12 x 14-in. engines, throwing under, on the same shaft. A spur wheel on this shaft engages the cogged rim of another wheel. This transmits its rotation to its shaft through a wood-lined friction clutch, the resistance of which is adjustable. A spur on this clutch-driven shaft engages the two rope-driving wheels. The rope makes three complete turns around this pair of wheels and a fourth passes around an idle wheel mounted on a truck which runs on a 50-ft length of track, and is kept in tension by an effective weight of 1½ tons supported from a steel-framed tower. The rope is driven at 80 ft. per minute, and is designed to haul groups of two wagons spaced 40 ft. apart. This intention is not strictly complied with. An 8-ft. cast-iron bull-wheel at the bottom of the main entry is placed between the down and the up haulage way.

The 6-per cent. grade of the tipple, Fig. 6, continues through a bricked arch, for 200 ft. down the haulage slope until it meets the coal; beyond this its grade is reduced by 0.5 per cent. every 25 ft. until one of 2½ per cent. is reached, at which inclination the haulage slope continues to its inward end. At 800 ft. in from the surface, the empties branch off into their own entry, which parallels the haulage entry for the rest of its length, but does not hold to a uniform grade. Of the four main headings the two outer ones form the return airways and are used for travelling and supplies. Of the two inner ones, both down-casts, the northern is the empty and the southern the haulage way.

To facilitate the handling of both loaded and empty cars, the expedient illustrated by the outline map in Fig. 7 was adopted. The plan shows the headings as opening into one another without reference to air currents. The arrows show the direction travelled by the cars, and the up and down grades are stated in reference to the same.

In order to obtain a steeper grade than that afforded by the face entry, the diagonal *a* was driven nearly perpendicular to the main haulage way to cut the face entry 500 ft. back. This secured a grade of 2 per cent., down which the loads would run freely in readiness to be clamped to the main haulage rope. The original face entry, between this diagonal and the main entry, was then abandoned to foot-travel. At a point, *e*. about opposite the original face entry, the empty main heading begins to rise inwardly, on a 2 per cent. grade, until it gets above the coal, at *f*. when it branches. The branch, beginning at once to go down grade, turns on a 30-ft. radius, crosses over the haulage way and one airway on bridges, *c* and *d*, and extends at *b*, down a 2.5 per cent. grade, parallel to the diagonal loaded track *a* above described, until it gains the level of the face entry. From its high point, or "knuckle," the main empty heading resumes its 2.5 per cent. downward grade to the next "flat," 1,200 ft. distant, when the construction is repeated. This arrangement saves all intermediate handling between the haulage rope in the main entry and the locomotive in the face entries. A boy standing at the high point, simply loosens the clamp at the upper end of the three-car trip, and switches them into the face entry, via *b*, to which they run themselves, and are made up into longer trips for the locomotive. In the same way, a boy uncouples the first three loads from the trip standing on the down grade, at *a*, when they run by themselves to the haulage rope, to which he clamps the leading car, and the rest follow. The up and down grades are readily secured by first removing the coal, as in an ordinary heading, then shooting down the roof and grading it on the floor.

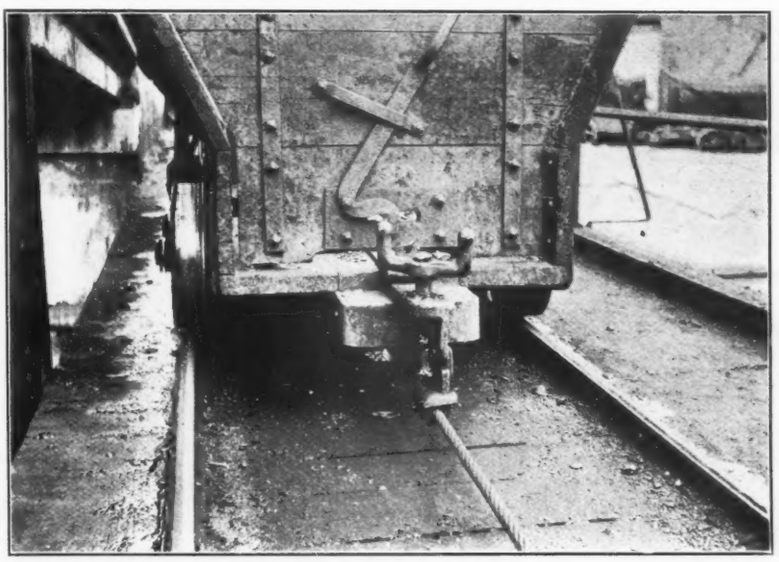

FIG. 2. ROPE CLUTCH.

The rope is carried on 8-in. maple rollers between the rails. At a switch, wherever the wheels have to pass over the rope, an angling section of rail is cut out; it makes rather a long jump for the wheels, but the abundant power of the rope enables them to do it safely. The main haulage entry, for a distance below each face entry, is abundantly lighted with incandescent lamps, so that the switch boys can see a trip, already on the rope, coming up from the lower workings.

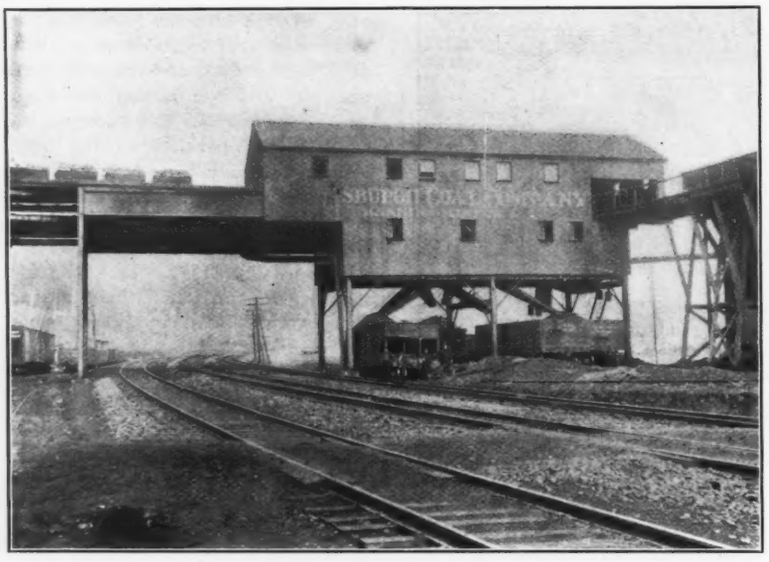

FIG. 3. BANNING NO. 2. TIPPLE.

Mexican Onyx.*

Puebla is the center of the onyx industry and large shipments are made to the United States; but dealers have complained that they were not always able to procure the onyx because those in control of the quarries preferred to elaborate it and sell it at retail. The opening of new industries promises to meet the demand in the United States, in some measure. Samples from the quarries of E. & C. Traslosheros, forwarded to the Bureau of Manufactures, are of many varieties and some are very beautiful. The price of the onyx at the quarries of Puebla averages $150 gold per cubic meter. Delivered at the railway stations in blocks, it varies from $175 to $200 gold, according to the distance from the quarries.

Conditions in Sonora.

George W. Maynard believes that a great injustice has been done Sonora by the American newspapers. He avers that they have shown up only the worst features of the Yaqui troubles and have not given the Mexican authorities the credit due them for their efforts to suppress the Indians. In a recent interview by the Tucson *Citizen* he is represented as saying:

"Ample military protection will be furnished American mining men by the Mexican government. Many of the past killings of Americans by the Yaquis have been due to needless and foolhardy exposure.

"I do not say that the Yaquis are not bad. They have killed, and will continue to kill, I believe, until they are either deported or killed. But the Mexican government is making great headway against them.

"Luis E. Torres, who is in command of all the troops in Sonora, is much hurt by the recent reports in American newspapers and was candid in his talk with me. He declared to me that if the Americans would only request it, they would be furnished with soldiers. I do not know of a single instance in which an American who was accompanied by a squad of soldiers was injured or killed.

"General Torres also stated that there are many Americans whose presence is desired in Sonora, but that there are some whom the Mexican government would not miss if they should return to the States. Any American who has occasion to visit Sonora will testify that this statement is well made. The order recently issued, which forbids foreigners to denounce mining claims, resulted from the misrepresentations of conditions in Sonora in the American press, and the statements in particular to the effect that the Mexican government makes little effort to protect mining men against the Yaquis."

*United States Daily Consular Report, No. 2481, Feb. 6, 1906.

Belgian Hone Stones.*

The district of Bihain, Belgium, with small parts of Salmchateau and Sart, has the hone mines or quarries of crystalline slate or coticula. In Bihain is found a quality of hone much appreciated by the cutlery manufacturers of England. These quarries have been worked for centuries, and are at present exporting their products to all countries. The strength and thickness of a stone usually determine its value. If a stone contains the white substance for more than one hone it is cut into small layers and one or two are attached to a stone procured from the quarries at Sart. This attachment is made by a paste composed of wax and black rosin.

It is best to place the usual valve next to the boiler and between the check valve and the boiler on the feed pipe. In case anything goes wrong with the check valve, the other can be closed and the check valve examined and repaired if necessary, without letting the water out of the boiler or waiting for steam to go down. Using the ordinary globe valve, it has been found that when the disk becomes loose, it will drop on the seat and act as a check valve, preventing any water entering the boiler.

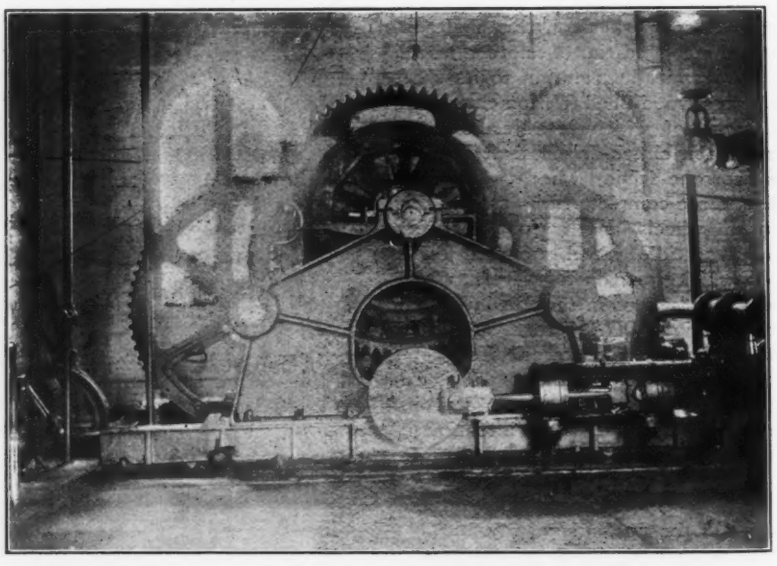

FIG. 4. ENDLESS ROPE ENGINE. BANNING NO. 2.

*United States Daily Consular Report, No. 2482, Feb. 7, 1906.

The Anthracite Coal Conference.

President David Willcox, of the Delaware and Hudson company, has published the text of the letter which he wrote, under date of Feb. 3, to John Mitchell, president of the United Mine Workers of America, concerning a conference between the mine workers and the operators to discuss the wage question. After agreeing to meet Mr. Mitchell in the conference, Mr. Willcox said:

'It seems appropriate to call attention to the situation in the anthracite industry arising from the fact that practically all matters involved have already been the subject of arbitration.

"All the existing relations between the employers and the employees are, therefore, the result of past arbitration and have been established by awards already made either by the Strike Commission or by the Conciliation Board. This method has been fair to all parties and has been successful. In December last the increase in wages by reason of the award of the commission was 16.60 per cent. for the miners and 17.78 per cent. for the employees by the day. For the year the increase in labor cost was 30.72 cents per ton, or an aggregate of $1,720,297.91. It may be added that the total increase in cost for 1905 over 1901, before the strike, was 36.77 cents per ton, or $2,059,093.57, of which, as just said, labor received $1,720,297.91, while the total increase in price was 37.57 cents per ton, or in the aggregate $2,103,892.99, so that the increase in bare cost of production absorbed the entire increase in price save $44,798.42, or about three-quarters of a cent per ton.

"It is true that the award of the strike commission ceases to be absolutely controlling as to future conditions after March 31, 1906; but its decision, after protracted investigation, must be regarded by any other tribunal and by all disinterested persons as conclusive in the absence of some new facts raising new questions. Similarly to judicial action, the adjudication is final as to the facts involved, and this is no less the case because the affirmative requirements of the judgment have been performed. Indeed, it is scarcely conceivable that any party to the award would seek to renew or re-try the very serious controversies which were fully heard by that distinguished tribunal, and were decided by it in pursuance of the President's injunction, 'to endeavor to establish the relations between the employers and the wage-workers in the anthracite fields on a just and permanent basis, and, as far as possible, do away with any causes for the recurrence of such difficulties as those which you have been called upon to settle.' Every consideration, both of fairness to the public and justice to the parties, dictates that the conclusions thus reached should be observed by all.

"The conditions established by the strike commission followed after very serious controversy, were the result of probably the most conscientious and exhaustive examination ever given to any labor controversy; on the whole, they have proved satisfactory, and have not even been the subject of very serious criticism. It, therefore, does not seem desirable to abandon the results reached with such difficulty, and so valuable in themselves, and resort to new methods which are uncertain and difficult. There is no association or organization of the producers of anthracite coals; but, even if there were, any arrangement between parties purporting to represent all the employers upon the one side and other parties purporting to represent all the employees upon the other side, might be subject to the charge of illegality and might not commend itself to public confidence.

"These suggestions are made in the interest of the public, and all the parties, for the purpose of avoiding future difficulties by continuing whatever beneficial results followed from the settlement of the strike of 1902. It is earnestly hoped that they will commend themselves to the best judgment of all as the proper course, and as far wiser than entering upon new and uncertain methods of procedure."

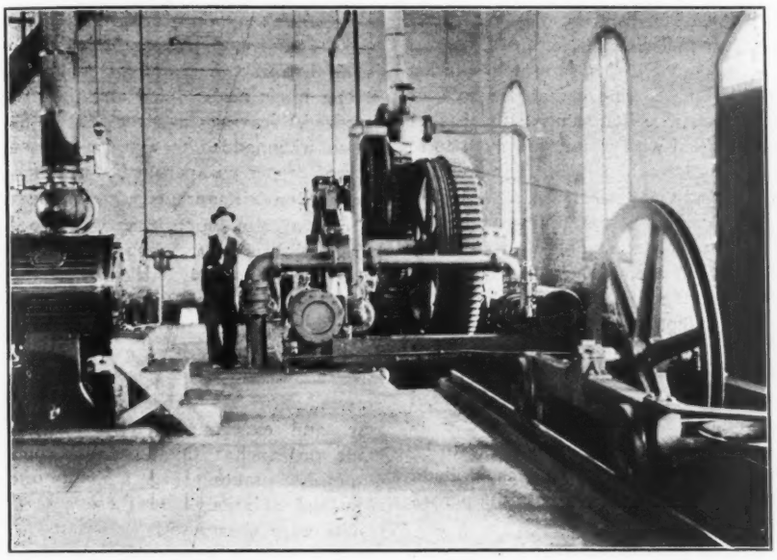

FIG. 5. ENDLESS ROPE ENGINE. BANNING NO. 2.

Well made tin, properly put on the roof and kept painted, looks and lasts well, is light, safe, easy to repair and economical. The difference between good and bad tin roofing is not more than 1c. per square foot.

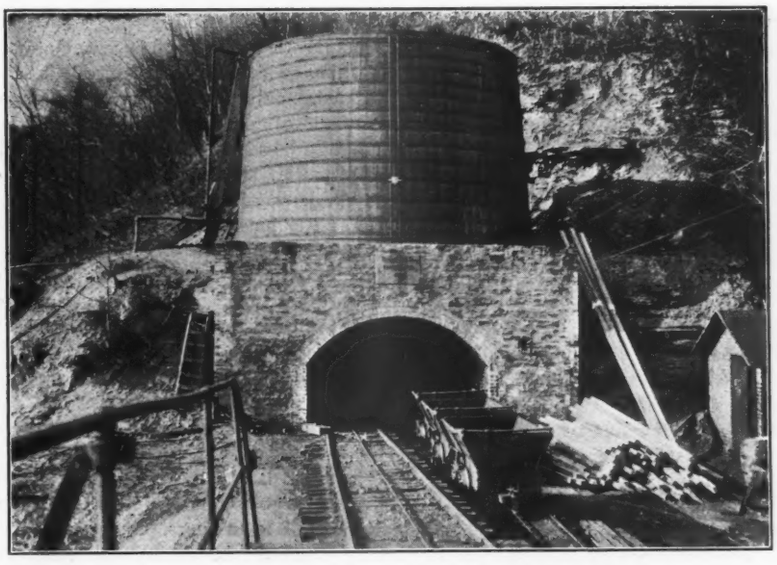

FIG. 6. MAIN SLOPE. BANNING NO. 2.

If a globe valve is put in with the pressure against the under side the stem to the valve can be packed while the pressure is on.

The Electrolytic Assay of Lead and Copper.*

BY GEORGE A. GUESS.

The increasing demand for greater speed and higher accuracy, in making daily assays of ores and products from mills treating material containing but very small quantities of lead and copper, has caused the older analytical methods to be supplanted by new ones devised to meet the needs of modern work.

For "control" work in copper analyses, I had, previous to the present equipment, introduced in my laboratory the ordinary electrolytic method, using hollow cylindrical electrodes, and with these I began a series of experiments in determining the lead-content of daily mill-samples and controls. The results proving accurate and satisfactory, I then devised, with H. E. T. Haultain, a cheaper electrode than the ordinary jacket electrode, which costs from $15 to $20—the expense of the older form making the installation of many units very costly.

The form of cathode finally adopted as the most satisfactory, is cut from 0.001-in. platinum foil. It is 12.5 cm. long, and is divided into a blade 4 cm. wide and 6.25 cm. long, and a tongue 0.7 cm. wide and 6.25 long, the immersion area being 50 sq. cm. and weight 1.5 grams. The blade is first sand-blasted and then corrugated lengthwise, in order to impart the necessary rigidity. Strips of platinum foil 0.001 in. thick, 12.5 cm. long and 0.5 cm. wide, having a median corrugation, form the anodes. In the lead analysis three electrodes are used in each cell; one anode in the middle and one cathode on each side of the anode.

The present equipment in the laboratory consists of two cabinets of 30 cells each, one used for lead and the other for copper-determinations. Each cabinet is individually wired in series, but both are connected in multiple and receive a current of 130 volts, which is controlled by enameled field-rheostats, one for each cabinet. Formerly, lamps were used to furnish the resistance. One voltmeter and one ammeter reading to 0.02 amperes is sufficient for both cabinets.

Exclusive of wiring at and from the power-house, the cost of installation was much less than $200. The platinum, ordered in sheets, was cut, sand-blasted and corrugated. Aluminum was purchased in ingots and cast into terminals. A carpenter took three days to make the cabinets. With this equipment I make an average of 45 lead- and 50 copper-determinations daily, besides attending to other work of the office.

I am not aware that any other electrolytic method is in practical daily use for the estimation of lead. In devising my method I have referred to the published articles of various chemists, and to the books of Classen, Neumann and Smith bearing on the subject. Briefly, the method is as follows:

The ore, weighed into a tall battery-beaker of 100-cc. capacity is digested with 10 cc. of nitric acid. The lead sulphate formed is readily dissolved after boiling by the addition to the beaker of from 10 to 20 cc. of a saturated solution of ammonium nitrate containing 20% of free ammonia. After solution the beaker is nearly filled with water, and from 10 to 20 cc. of nitric acid added. The solution is now ready for electrolysis. A wide range of current strength is permissible, but from 1.5 to 2 amperes is most satisfactory; this keeps the solution sufficiently hot during electrolysis. At the end of two hours, the lead is completely deposited on the anode in the form of peroxide. The anode is then removed, washed in water and in alcohol, ignited and weighed. The theoretical factor is 0.866; but in practice 0.855 is found to be more accurate; probably due, as Holland says, to an excess of oxygen in the peroxide.

The accuracy of this method ranks with that of carefully made electrolytic coppers, and its great advantage is the small amount of the chemist's time required. In the presence of manganese or antimony, it is necessary to have a large excess of free nitric acid in the electrolyte, under which condition neither element interferes. Bismuth, even in the presence of very large amounts of free nitric acid, is partly precipitated as bismuth oxide with the lead. Its presence can be recognized by a light-blue color given to the peroxide coat. Arsenic and tellurium have to be removed before electrolysis, for if present in large amounts they effectually prevent any deposition of lead. Unless the anode is sand-blasted, only a comparatively small amount of peroxide will adhere, but, properly sand-blasted, adherent deposits of 250 mg., and even up to 600 mg., of peroxide may be obtained in daily work.

For weighing the pulp I use a weight of 855 mg., which has been christened a "plum," and multiples thereof, in order to avoid the necessity of calculating each result, the weight of peroxide found being called lead.

The same style of electrodes are eminently suited for copper work. Apart from the cost of platinum the great drawback in the use of the electrolytic method for copper-determination in daily work is the time required for the electrolysis, usually from 8 to 12 hours. Many substances were tried in the attempt to lessen the time of the copper assay, but the cathode was usually dark colored when the current density was increased. While determining the copper in a concentrate obtained with the use of No. 4 hard oil of the Standard Oil Co. and retaining some of the grease, a peculiar glossy luster was noticed on the deposited copper. We then treated some of this hard oil with nitric acid, and the solution, freed from grease, we then added to a solution to be electrolyzed. The current was increased to 5 amperes, which is about 25 times the usual practice, and still the copper continued to come down bright. The preparation of this nitro compound called "dope," for use in electrolytic copper-determinations, is as follows: hard oil is boiled with strong nitric acid, cooled and the grease removed, leaving a deep-red solution which when added to a nitric-acid solution of copper will permit the use of high current densities and yet, under these conditions, all the copper may be deposited pure and bright in 3 hours. Moreover, arsenic and antimony, which interfere seriously in ordinary electrolytic precipitation of copper, do not contaminate the deposit of copper, even if present in very large amounts. More than 3,000 copper-determinations have been made in this way, and experiments have also been made on smelter flue-dust and copper-dummies containing large amounts of arsenic and antimony. In these cases the results were always satisfactory.

Oil is used in electrolytic work as follows: The ore, weighed into tall battery-beakers of 100-cc. capacity, is digested with 7 cc. of nitric acid, and boiled until nitrous fumes have been expelled. About 2 cc. of dope, diluted with nitric acid, is added (or it may be added with the acid), the beaker filled with water and allowed to settle for a moment, it is then electrolyzed with a current of 1.5 amperes for 3 hours. The cathode must be sand-blasted, otherwise the copper is apt to fly off when it is ignited.

There should be no gasing whatever at the cathode during electrolysis. The cathodes frequently gas when the current is first turned on, but if turned off for a second and then on the gasing should cease. The cathode frequently gases at the end of 3 hours, when the assay is finished.

Several different nitro-hydrocarbons have been tried instead of the dope in the 3-hour copper assay, and of these, dinitro-alpha naphthalene produces, with a little more care during electrolysis, results nearly equal to the dope.

* A paper in the *Transactions* of the American Institute of Mining Engineers. Bi-monthly Bulletin, No. 6, 1905. Subject to revision.

Contracts were recently closed for the electrification of the Philadelphia-Atlantic City line of the Pennsylvania railroad. The power house will be located at Camden, N. J.

The Italian iron industry derives the greater part of its ore from the isle of Elba, where the mines are owned by the State.

It is stated that the world's supply of platinum in 1904 included 9,625 troy ounces from South America, and 192,500 ounces from Russia.

THE ENGINEERING AND MINING JOURNAL

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*Illustrated.

OUR READERS will surely be greatly interested in the account of the new gold camp, Manhattan, of Nevada, which is published elsewhere in this issue. Our correspondent is a mining engineer of high standing and wide experience. We believe that this is the first authoritative statement as to the discoveries in this new camp, now attracting so much attention, which has yet been published.

The Anthracite Conference.

While this issue is on the press, the conference between Mr. Mitchell and the anthracite coal operators, scheduled for Feb. 15, is being held, and discussion as to the general situation is best deferred until the outcome of the conference is known. Elsewhere in this issue we publish a portion of the letter addressed to Mr. Mitchell by President Willcox, which strongly and correctly presents the position of the operators, and incidentally to some extent that of the unorganized third party, namely, the pubilc, on this important question. Unfortunately, Mr. Willcox weakened his otherwise strong case by denying the existence of any combination among the operators, which (although technically a true statement) is practically an evasion of the fact, as everyone knows.

The Montana Settlement.

The purchase of the Heinze properties at Butte by interests allied with the Amalgamated Copper Company will be hailed with pleasure as the consummation of the settlement of a mining feud, that has thrown discredit on the industry, on the bench, and in fact on nearly everything on which its shadow has fallen. The vast sums of money which have gone to fatten the lawyers and to corrupt legislature and judiciary, together with that expended in experts' fees and in mine developments to prove the contentions of both parties, undoubtedly represents far more than the difference between the original views of the contestants—traders, we might well say. Disgust at the unnecessary waste is tempered only by the recognition that the expenditure in mine developing has contributed largely to geological knowledge, and has moreover aided materially in the discovery of new ore deposits and prolongation of the life of Butte. An early effect of the settlement will doubtless be an increased copper production from that district.

The De Lamar Lead Refinery.

The De Lamar's Copper Refining Company has bought a property in East Chicago for the purpose of erecting a lead refinery of about 2500 tons per month capacity. The refinery will be in operation during the second half of this year and will treat the product of the United States Mining, Smelting and Refining Company, and also custom bullion, partly contracted and partly to be contracted for.

Experience has shown that Chicago is a very suitable location for works of this character, it having been an important lead refining center ever since the sixties, and being now the location of one of the important refineries of the American Smelting and Refining Company. The establishment of the new plant will afford healthful competition which will tend to stimulate the erection of small lead-smelting plants in the West, like several which were undertaken last year.

The De Lamar refinery will be of especial metallurgical interest, inasmuch as the Betts electrolytic process is to be employed, and it will in fact be the first electrolytic lead refinery in the United States, although not the first in North America, the process having been in use at Trail, B. C., for several years. It is to be hoped that advantage will be taken of the far wider range in the market of this country to recover antimony and bismuth from some of the base bullion that is offered; we have no doubt that this possibility will be seriously considered.

Conditions on the Rand.

The feeling both in South Africa and in London as to the future of mining on the Rand is becoming strongly pessimistic, which is reflected in the letters of our London and Johannesburg correspondents published in this issue. The order of the new ministry of Great Britain forbidding the further importation of coolies from China, which in some quarters was originally considered lightly as a mere move for political effect in the pending election, has come to be regarded much more seriously since the sweeping victory of the Liberals, wherein the Chinese exclusion policy appears to have played a strongly contributory part. The fear is therefore natural that the ministry will now feel constrained to play a strong hand along the line which it has already inaugurated.

As a result of the forebodings of disaster, Kafir shares have been declining in the London market, the further fall in them last week threatening the status of all securities. The situation is becoming serious, inasmuch as a further fall may cause financial troubles to the mines themselves. Huge sums of money are required to bring the "deep-deep" mines to the producing stage, i. e. the line of properties opening the banket on its dip beyond the line of the "deep" mines. Various gigantic schemes are pending, for which success is anticipated if industrial conditions continue favorable and the necessary money be forthcoming, in the failure of which general disaster is to be foreseen. The situation is complicated by the undoubted over-capitalization of the Rand enterprises, which makes abundant labor and cheap labor indispensable. The producing mines of the field have not ceased to be profitable—they paid nearly £5,000,000 in dividends in 1905—but this was possible only under the amelioration in labor conditions, which the importation of the coolies afforded.

The Situation in Copper.

In our issue of Jan. 6, we estimated the copper production of the United States in 1905 at 925,000,000 lb., in round figures; the total supply at 1,340,000,000 lb.; the stock on hand at the end of the year at 66,000,000 lb.; and the domestic consumption at 659,000,000 lb. We shall publish revised figures later, when complete official reports have been received; those already in hand indicate the probability that we overestimated the domestic production by about 25,000,000 lb., which of course would reduce the apparent consumption by a corresponding amount. In any case, the actual consumption of the metal in a single year can be only roughly approximated, since it is arrived at by difference between the total supply and the exports, plus stock on hand at the end of the year; and the stocks can never be precisely determined. At the end of 1905 the quantity of refined metal in first hands was relatively insignificant. There is, however, always a large amount of metal in transit and in process of refining, the time between the shipment of the metal from the original smeltery and its delivery from the refinery (or to the purchaser in the case of Lake copper) ranging from 90 days to 20 days, which it is necessary to take into account in computing stocks.

However, it appears now that although the stocks of refined metal in first hands at the end of 1905 were practically *nil*, the stocks in second hands were considerably larger than was then supposed, some consumers having provided themselves with more than they immediately needed, and in a few cases, the re-sale of some of the surplus was offered, while there were also re-sales in Europe by China of copper previously purchased in America, which of course cut off a demand that would otherwise have been filled perhaps by direct exportation from this country, these transactions having been induced by the high price then ruling for the metal. It was indeed the rapid and extensiye rise in price during the early part of December, inspiring the fear of a famine in the metal, which caused some consumers to overbuy and led directly to the stagnation in the domestic market, that has existed since just before Christmas and has lately produced a decline in price.

At the present time the views of the situation are widely different. The large consumers are generally well supplied for a considerable time to come, contracts for delivery as far ahead as June having been made in some cases during the recent activity in the market, and are now in a waiting attitude, seeing no inducement to provide for future requirements so much in advance as appeared advisable a little while ago. They are one step closer to the ultimate consumption than the sellers of refined are, and possibly see the signs of a slackening in the demand, which excessively high prices inevitably bring about at some stage or other. On the other hand, the producers are generally confident of the soundness of the conditions which put the price to its recent high mark, and the selling agencies which represent the output of a large percentage of the copper refined in this country are holding their metal at 18⅜@ 18½c. They are making no sales, but being already well sold ahead they feel no urgency to do business, and are also in a waiting attitude, confident that the large consumers will soon be obliged to re-enter the market and pay the price asked. In the meanwhile business is being done by those who are willing to sell copper, and the market is made around 17⅝@ 17⅞ cents.

The situation is peculiar, and in some respects has resembled that of 1901, with the important difference that the price was then artificially upheld by the the Amalgamated Copper Company, which stocked its metal while other interests sold at a concession from its asking price; but nothing artificial exists in the present condition, and there is no sign of the accumulation of any stock. The immediate future depends largely upon the actual status of the demand for final consumption, in other words, the general business condition; if this continues as good as it has been, there must be soon another upward movement of the metal; if it shows a falling off, or if the present dullness continues much longer, one or another of the large producers now holding aloof, will be likely to reduce his asking price. In the meanwhile the producers have it in their favor that the business in copper is on a hand to mouth basis, and an accident to any important producer—such as a fire in mine, smelting works or refinery—would immediately cause a scramble for metal; while against them is the specter of a strike in the coalfields, which would seriously check business in all directions. During the present week the market has certainly assumed a stronger tone.

The Open Shop.

The printers on this publication went on strike January 1 for an eight-hour day at the nine-hour pay and the perpetuation of the closed shop. The Hill Publishing Company issued to these men the circular printed on the following pages—but they all went out, are out now and, so far as the company is concerned, always will be out. It had no difficulty in finding men to do its work, as it pays the highest wages, gives its men the best treatment and has the lightest and cleanest place in New York in which to work.

Now that the fight is on it seems well for us to put ourselves on record and to let our readers and advertisers know just exactly where to find us on this all-important question.

On the question of the OPEN SHOP we stand four-square to the world for the OPEN SHOP; not alone in our own plant, but in every institution, great and

small. We have consistently stood for this principle in the past; we shall continue to do so in the future.

This we do now and shall do, not for the benefit alone of the employer of labor, but in the true interest of every man who works for his daily bread.

The closing of the workshops of this country in any trade is a menace to personal liberty greater than any ever attempted or dreamed of by any other monopoly-hunting trust on earth.

We have no objections to unions or union men except in so far as they assume control over the rights, life, liberty and happiness of others.

We assert the right of men to organize for any legitimate purpose; therefore we do not oppose great aggregations of capital or great organizations of workmen—except when either of them attempts to monopolize and control something, when such monopoly tends to rob some or all of us of something that is our own. We are opposed to monopoly in any form.

Free, open competition is demanded for everybody. We believe that the American people are sick of shouldering the useless expense, annoyance and trouble caused by strikes and lock-outs where the issue is "the recognition of the union" or the closed-shop question.

We believe we will serve the best interests of the good, capable workmen of this country if we can materially aid in bringing about the universal adoption of the open-shop principle—and we propose to do it.

The right of every man to work when and where he pleases, for the best wages he can secure, should be undeniable. Yet the closed-shop unions do deny this right and abuse, villify and assault the man who works where they refuse to work.

The right of every shop-owner to hire whom he can, on the best terms he can, should also be undeniable; yet these unions do not hesitate to conspire to drive away his employees, to stop his works and boycott his product to ruin his business.

Now when the American people are convinced—and they are long suffering—that their rights and liberties are attacked, they deal swiftly and surely with the usurper. Our liberties are attacked, and the people are demanding relief *now*.

This is no time for any individual or any publication to straddle and wabble and dodge the issue.

Here are the two sides:

The open shop, free opportunity, a chance for young men to learn trades, liberty, and the development of all our national industries; or

Monopoly, intrigue, bossism, restriction of output and apprentices, coercion, and the blight that comes to manufacturing, trade and commerce when in the hands of irresponsible autocrats whose only law is rule or ruin.

For sooner or later every close-communion union gets into the hands of a clique of rampant talkers—the best members do not take part, they blindly obey.

The union members are only a small percentage of the workmen of this country, yet they assume to make laws of their own that debar a majority of American workmen from free opportunities.

Now this minority of workmen, with their talking officership, never hesitate to take the offensive and to tell what they will do to and about all who disagree with them, and it has become a habit for people, especially employers, to fear them and surrender before a fight.

When they have been met fairly, face to face, for an open fight, where they were in the wrong they have always been whipped.

One remedy, then, is to face the question and fight for freedom.

The boycott and the black-list are favorite weapons of the star-chamber clique of the unions, as the stiletto and a dark night are the favorite weapons of the Corsican bandit.

But the "unfair list" is becoming so large and the names there include so many of the foremost concerns in the land, that it has become more a roll of honor than anything else.

If we are boycotted, well and good! We hope for the support of only such readers and advertisers as believe in individual liberty; who realize that the closed shop has already led to the partially censored press, and may lead to the closed mouth.

We have an abiding faith that the free and fair men of the industries we represent are in the majority.

We hope to deserve their continued support and have already arranged to get along without the aid of those who are opposed to the liberties of *others*, as well as themselves.

When the people of this free country have to organize citizens' alliances and anti-boycott associations to protect themselves from the annoyances and impositions and expenses of the attacks of a comparatively few union men, to close shops and mines to men who do not care to join them, it is high time for the people who love and respect our Ship of State to line up and arm to repel boarders.

We appeal to the honest and efficient workmen of this country to come out for the open shop.

Keep up your union if you have one, attend its meetings, talk and *vote*, and do not believe the professional agitator who declares that all employers are rapacious and that the closed shop is the only insurance of union stability.

Employers are like other men—good, bad and indifferent, but mostly fair.

Other unions, like the Brotherhood of Locomotive Engineers and the Brotherhood of Locomotive Firemen, are open-shop unions; they work with anybody the company hires and have each done more for their membership than any closed-shop unions on earth.

The National Association of Stationary Engineers is purely educational and devotes all its energies to making its members better engineers, which will in time, if it has not already, put its men on the "preferred list" of all fair-minded employers—men who want to hire efficiency will soon find where it is made.

We have no sympathy for the union baiter who proposes to destroy the unions. Workmen have the same rights and the same incentives to form unions as the employers have to form associations in their trade.

On the other hand, we have no use for the rule-or-ruin policy of those unions that strike for the closed shop and a monopoly of employment in any trade. We are not against the unions, but the unlawful acts of unions.

All the intelligent mechanic of this country needs is a free opportunity to work, and, if he be ambitious, to advance himself—to become a foreman, a superintendent or an owner.

The closed union tends to make a workman always a workman.

We believe in the open shop for America, and shall do our level best to secure it in every industry.

If the unions can punish us for taking this position, we will take "what's coming to us" with as good grace as may be, consoling ourselves that we stood for the right as it is given us to see the right.

Metallics.

Promptly bathing a bruised part of the hand in turpentine is reported to prevent soreness and possible blood-poisoning.

Half a pound of vaseline and one ounce of blue ointment, thoroughly mixed, makes a good rust preventive for tools.

All surfaces with which cement mortar or concrete comes into contact should be wet to the point of saturation, before the mortar or concrete is laid.

Bricks are always laid wet in the summer, but it is the practice of some architects and engineers to have them laid dry in the winter on account of the action of frost.

A dressing for wire rope, which has been found satisfactory, is composed of 240 lb. of Stockholm tar, 56 lb. of tallow, and 20 lb. of graphite. This mixture is boiled and applied hot to a dry rope, on which it will last for several months.

The members of the engineering department of the University of Arizona are studying the method of measuring rate of movement of under-flow streams. The work is being carried on for the purpose of developing the resources for irrigation in the neighborhood of Tucson.

A small gas engine will take about 30 cu.ft. per brake horse-power per hour, and a large one as little as 17, when running with gas having a calorific value of about 680 B.t.u. per cu.ft. As the engines are used, and the accumulations of soot and scale form, the quantity required may be doubled.

Boiler stay-bolts break in large numbers where bad water is used, and during a period of three or four years, the stay-bolt breakage ranges from 30 to 60 per cent. of the horizontal installation of water space stays. In places where good water is used the breakage ranges from 10 to 20 per cent. in four years, and 30 to 50 in six.

Tests have been made recently on the corrosion of boiler-tubes by forcing air through tubes made wet with distilled water. In 16 weeks the loss in weight was .315 gram per sq. in. When the water was made alkaline the loss in the same time was reduced to only .0997 gram. It appears that if the water in the boiler is made slightly alkaline the corrosion of tubes may be materially reduced.

Quick time has been made in the construction of the Pennsylvania railway tunnel under New York. Not a little of the success attained by the contractors is due to the rivalry aroused by the gang foremen, who mix the races where the work is hardest. For instance, alongside of a Pole will be stationed an Italian, and next to them will be put an Irishman and a negro. Race pride does the rest.

The original or true babbitt metal was patented by Isaac Babbitt, of Boston, in 1839; it contains 24 parts tin, 4 parts copper and 8 antimony. A tougher metal is made of tin, 96 parts, copper 4 and antimony 8 parts. Lead is also added in some cases on account of its cheapness. In small amounts it is not objectionable, but the metal sold in the market ready mixed usually contains more lead than its price would indicate.

As to star bits vs. chisels, some engineers express their preference for starters and seconds of cruciform steel, and for all others chisels up to any length. Chisels bore faster and cost less than star bits, but ⅞-in. steel cannot be efficiently used for the last chisel for a big machine. It is certainly advisable to use steel of varying sizes, but ⅞-in. steel is too light for long chisels. It can be "staved up" to give the necessary shoulder margin to bore the bottom of the hole large enough to take 1¼-in. explosive, but in hard rock and a long hole such a chisel will almost certainly bend, and the tendency will be to drill the bottoms smaller than they should be.

Bronzes containing lead are much used for bearings. The lead does not alloy directly with the bronze, but remains in separate particles, which are seen under the microscope. The lead increases the plasticity of the alloy to a marked degree. There is a tendency to the separation of the lead by liquidation, as it has a much lower solidifying point than the bronze. Even if the metal is not poured until it has acquired a pasty consistency, there is a tendency for the heavy particles to sink in the mass. It is difficult to be assured of an equal distribution of the metals in such alloys, and the exact composition at the rubbing surface is unknown.

It is the convention among architects to charge for their services at the rate of 5 per cent. of the cost of the work designed and supervised. The practice of engineers in determining the rate of remuneration for their services is so poorly defined that all data on that subject are valuable. In preparing the plans for the terminals and boats for the new municipal ferry between New York and South Brooklyn the architects, naval and civil, are to receive 5 per cent. each on the cost of the work they supervise, and a consulting engineer-in-chief is to be paid a fee amounting to 1 per cent. on the total cost of the completed system.

A chip of steel that had been imbedded in the palm of a man's hand for a year and a half, and another piece of steel that had been in the back of a hand for several years, causing much suffering, are reported to have been extracted recently by the electro-magnet, which is better than the surgeon's scalpel in such cases. A suitable magnet for this purpose is reported to have a core 4 ft. long and 6 in. in diameter and is insulated with special cartridge paper. At least one of the New York hospitals has a magnet used for this purpose, which is built more nearly on the proportions of Sir William Thompson's (Lord Kelvin's) stumpy electro-magnet. This ought to be more applicable, on account of its concentrating powers, than the longer magnet mentioned.

Turning a crank is less fatiguing than hammering. It is estimated that the daily work developed by a man hammering is about 480,000 foot-pounds, while in turning a crank he develops 1,300,000 foot-pounds. It consequently follows that turning a crank, with resistance well balanced with a fly-wheel, is a better way of utilizing a man's strength than by direct hammering. Machine-drill makers are now perfecting hand-drills for mining work. The mistake was formerly made of endeavoring to produce hand-machine drills to compete with power drills. It was not recognized that there was a good field for small light drills to utilize a miner's strength to the fullest degree. There are now several small hand-machine drills on the market.

C. J. Bogardus, of the Erie Railroad, Elmira, N. Y., presented at the annual meeting of the Maintenance of Way Master Painters, in Cincinnati, Ohio, a paper on removing dirt and rust from steelwork by various methods. He states that the least expensive way is to scrape the iron well and to remove dust and scale by pounding it off with a special form of hammer made with a hammer face on one side and a chisel point on the opposite side. This enables one to get into many places about a bridge that could not be reached with the ordinary hammer. Of course, this tool cannot be utilized in all cases, and where such is the case a tool similar to a chisel, only larger, is used for cleaning off the paint and rust between the ties, etc. After the metal is well hammered and scraped, it is best to use wire brushes and then remove dust before painting. It is essential that the iron work be thoroughly cleaned in order to get the best results.

Where the plumbing fixtures or piping are nickel-plated, plumbers use a mixture of whiting, made quite thin with water, to preserve the finish. In applying a sponge is dipped into the mixture and then rubbed lightly all over the nickel-plated work. When ready to use it is rubbed off with a piece of flannel, and the plating will shine as bright as if it had just come from the plater's. The whiting will preserve the plate for an indefinite time. When working brass pipe it is sure to become dirty and stained, and it is difficult to remove the discoloration and renew the brightness. To clean the pipe after it is in place, take some fine sea sand, such as masons use when running white mortar. Put it in a pan, wet it, and then take a handful and rub the pipe briskly for a few minutes. A smoth, clean polish will result that will gratify the eye. If it is carefully dried while it is still bright, a coat of colorless varnish of lacquer will protect it.

Colliery Notes.

In general, rope haulage is adapted to long, straight roads having considerable inclination.

There are four classes of rope haulage: Gravity-plane haulage, engine-plane haulage, tail-rope haulage and endless-rope haulage.

Electric or compressed air motors are often preferred to rope haulage in mines where electricity or compressed air is used for running machines at the working face.

The coal production of the United States now exceeds 1,000,000 tons per day, of which the railroads consume about 40 per cent. A locomotive consumes about $5000 worth of coal per year.

Mule haulage should be replaced by some form of mechanical haulage when the development of the mine has progressed so that the several districts of the mine will supply enough coal to keep the system running.

Except in small mines there are two stages of underground haulage: The gathering stage, in which the coal is moved from the face to the inside parting or side track at the inbye end of the main haulage rope, and the stage in which the coal is moved from the inside parting to the foot of the shaft or slope or to the mine opening in a drift mine. The gathering stage should always be the shorter one of the two.

The mine foreman and his assistant should constantly maintain a quantity of air flowing through the mine workings, sufficient for all purposes, namely, to provide fresh air to the men and animals, to dilute and render harmless all gases dangerous to the health and safety of the workmen; by doing so the lives and health of the workmen are better protected, the mine is less liable to destruction, and the cost of production is reduced.

An excellent illustration of the benefits of large airways in mines is supplied by two well known Pennsylvania mines. One employs a 16-ft. diam. Guibal fan, forcing 30,000 cu. ft. of air per min. into the workings. In the other mine a 12-ft. diam. Guibal fan is working and supplying 60,000 cu. ft. of air per minute to the workings. The capacity of the 16-ft. fan running at a velocity of 60 r. p. m., is about 2.4 times greater than that of the smaller fan, yet the latter supplies twice as much air as the 16-ft. fan. The difference in capacity is due to the dimensions of the airways only. The larger and straighter the airway, the smaller the friction encountered, and consequently the better effect the fan will have.

The Indiana mining law requires that no shooting be allowed in the mine in working hours, except when opening a new mine employing not more than 20 persons and advanced not more than 300 ft. in any direction from the bottom of the shaft. No person may fire any shot in any working place or entry, before all shots have been fired in places beyond this, and it is required that all miners and other persons shall have passed such working place on their way out of the mine. When shooting off the solid, no person may drill a hole for the purpose of blasting more than one foot ahead of the cutting or loose end, or prepare a shot in such a way that the distance from the hole to the loose end shall be more than 5 ft., measured at right angles to the hole. No person may place more than 8 lb. of blasting powder in any hole, or shoot it when he knows it to contain more than 8 lb. of blasting powder.

Before drawing pillars it is necessary to consider the character of the roof, floor and coal with respect to the width of the pillars, remembering that the drawing of a few pillars from under a strong roof may throw a great pressure on the adjoining pillars that remain, because the roof is firm. In this case a sufficient number of pillars should be drawn together, the work advancing in a straight line more or less parallel to the entry, and care should be taken to draw all standing timber as the work progresses, and to induce a fall of the roof in the abandoned workings, so as to relieve the pressure from the adjoining pillars. It is also necessary to consider any possible damage to the surface or inflow of water into the mine, or the question of how the drawing of pillars will affect any contiguous seams. These considerations may show the advisability of allowing the pillars to remain or of adopting some method of filling the workings or breast opening before the pillars are drawn.

The Indiana mining law requires a mining boss to keep a careful watch over all ventilating apparatus and airways, and to see that all loose coal, slate or rock is taken down or made secure; to measure the air-current at least once a week at the inlet and outlet and at or near the face of all entries, and to keep a record of such measurements in a book kept for that purpose; to mail a copy of such measurements to the inspector monthly, stating the number of persons employed in or about the mine, the number of mules and horses, and the number of days worked in each month. He must also visit and examine every working place in the mine at least each alternate day while the miners of such place are or should be at work, and to examine and see that every working place is properly timbered. He must also see that a sufficient supply of props and timber is always on hand at the working places. He must see to it that any unsafe place or condition reported be at once made safe, and that no person enter such place until this work is done; and must also give to the miner reporting such condition acknowledgment of such notice. In case of accident he is required to notify the inspector of mines.

Correspondence and Discussion.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested.

Readers are invited to use this department for the discussion of questions arising in technical practice or suggested by articles appearing in the columns of this JOURNAL.

Letters should be addressed to the Editor.

We do not hold ourselves responsible for the opinions expressed by correspondents.

Concentration of Silicious Copper Ore.

Sir—The present high price of copper should turn the attention of metallurgists to the subject of concentration of copper ores, and more especially to the study of processes for dealing with highly silicious ores. There are in many parts of the world large deposits of such ores which can neither be smelted nor concentrated. Some cannot be smelted owing to lack of flux, and others are of comparatively low grade, so that even when fluxes are plentiful the amount that has to be added brings the copper contents of the furnace charge to an unpayably small quantity. As regards concentration, so much is lost on the tables that in comparatively few cases is the recovery sufficient to make a commercial proposition.

I believe that a solution of this difficulty will be found eventually in the substitution of an oil process, or flotation process for ordinary water concentration. My hope may seem unduly optimistic, seeing that the Elmore oil process has been tried at various mines and abandoned. For reasons which need not be entered into, this processs was never fully tested, having either been tried on extremely low-grade ore, or on better-class ore where the margin of increase in extraction obtained by it over water concentration was not sufficiently great to warrant its use. The acknowledged weak point of the process is the large amount of oil that had to be used in order to make the suspension of the metallic particles complete. The failure of one particular way of using oil, or other fatty or greasy matter, as a selector is no reason for despair, and it is probable that if some method could be devised for using oil as a selector without requiring it to lift its burden against gravity there would be a much greater chance of success.

The flotation processes devised for treating the Broken Hill tailings also appear to be applicable to the case of silicious copper ores. These processes were of course invented because the near identity of the specific gravities of the sulphides and the gangue made water concentration entirely out of the question, but they should be equally applicable for recovering chalcopyrite. The fine particles that float off the water tables would be caught and agglomerated into a scum. If the silicious ores contained no carbonate, which is necessary for the evolution of the bubbles, limestone or other carbonate would have to be added. The amount re-

quired is very small compared with the bulk of ore, and in a district where limestone is not found in large enough quantities for fluxing purposes, its scarcity should be no bar to the success of a flotation process. In the Elmore modification of the Delprat and Potter flotation processes, the amount of material to be added for the generation of gas would be very small indeed.

It is to be hoped, therefore, that metallurgical inventors will turn their attention to the application of oil and flotation processes to copper ores, and that mine owners with silicious copper ores will seek out all inventions and processes that are likely to help them. W. E. P.

London, Jan. 20, 1906.

[We think that our correspondent misses the point with respect to the metallurgical treatment of the class of ore to which he refers. It is a sound fundamental principle of metallurgy that it is cheapest to effect concentration by the simple, comparatively inexpensive processes, in spite of high losses, in order to reduce the bulk of the material that must be treated by the expensive processes, like smelting, converting, and electrolytic refining. All metallurgical processes are, so to speak, methods of concentration, the result aimed at being the refined metal.

Ordinary water concentration, by jigging or washing on tables, is about the simplest and cheapest of all metallurgical processes. The success in concentrating extremely low-grade silicious copper ore has been amply demonstrated in practice at Bingham Cañon, Utah, and experimentally in the handling of the similar ore of Ely, Nev. The disseminated copper ore of Bingham is difficult to concentrate because of the fine grinding that is necessary to liberate the mineral. Under such conditions, a rather high loss is naturally to be expected, but similar ore of a coarser crystallization of mineral is concentrated with a high degree of efficiency, as for example, at Nacozari, Mex. It is doubtful if the Elmore, or any other special process, would do any better.

The chief drawback to these special processes is that they cost so much more per ton of ore than does ordinary wet concentration, wherefore a great increase in the extraction of mineral is necessary to offset the difference in cost. There are special cases where water is unavailable, wherein the problem which our correspondent suggests, may be worth investigating. In that connection the application of electrostatic separators should be considered. Electrostatic separation is a strictly dry process. Experimentally it has given some promising results in the separation of copper minerals from a quartzose gangue. Editor.]

Mechanical vs. Hand Firing.

Sir—I have recently read in the JOURNAL (Nov. 18, 1905, p. 913) the article entitled "Mechanical and Hand Firing." From this one would deduce that mechanical stoking is of but little value in steam plants. In view of many years' extensive experience with hand and automatic stoking. I venture to inquire whether the writer of the article has stopped to consider that few physicians would recommend the same medicine for every ailment. Every automatic stoker has its proper place, and when used in that place is of value, and of much greater value than hand-firing can ever expect to be; indeed, in a modern power plant where the proper stoker is employed, hand-firing would really be a relic of past generations.

On different fuels different types of stokers are of value. I have seen one of the best types of anthracite stokers beaten by 15 per cent., when working on bituminous coal, by a stoker more especially adapted to soft coal burning; and I also know of plants in the Rocky Mountain region where coal bills have been cut one-third through the use of an inferior coal, stoker fired, at these same plants situated thousands of feet above sea level. In daily practice I know of dozens of cases where proportionate economy is enjoyed, and entirely through the use of the proper stoker under proper conditions. Were engineers and purchasers to take this fact into consideration when buying mechanical stokers, the article you published would never have appeared. By reason of the prominent position occupied by your article, may I not ask that in a spirit of fairness this letter be published also?

C. P. OVERFIELD.

Salt Lake City, Jan. 1, 1906.

[Such arguments as were presented in the article referred to were based precisely on the consideration which our correspondent suggests, namely, that few physicians would recommend the same medicine for every ailment. We think that it is our correspondent himself who disregards that consideration. The contention that the automatic stoker is "of much greater value than hand-firing can ever expect to be" is a statement with which we cannot agree. Too much is dependent upon local conditions, and there are too many cases where hand-firing has proven the more economical (and vice versa) for any hard and fast rule to be laid down. The article in question was a simple statement of some results actually obtained in practice.—Editor.]

Workingmen's Insurance and Employer's Liability.

Sir—The Bureau of Labor is preparing a report covering the various systems of workingmen's insurance and employers' liability both in this country and abroad. The report will cover insurance against sickness, accident, disability, old age, death, and unemployment.

In this connection it is endeavoring to secure information concerning the existence in the United States of what are usually known as establishment funds—that is, mutual relief or insurance funds organized and maintained by the employees of an industrial establishment, or relief funds supported either wholly or in part by the employers themselves. It is desired to obtain, wherever possible, copies of constitutions, rules and by-laws, blank certificate forms, and any other matter relating to funds of this character. In the absence of other data the name and location of establishments in which such funds exist are desired.

In view of the wide circulation which the JOURNAL has among employers of labor and others who may be in a position to furnish information regarding this subject, I would esteem it a great favor if you would insert in an early issue of the same a brief mention of the above facts, with the request that persons possessing data of any kind relative to the existence of establishment funds in this country communicate with me at their earliest convenience.

CHAS. P. NEILL,
Commissioner.

Washington, D. C., Feb. 10, 1906.

New Publications.

"Modern Machine Shop Construction, Equipment and Management." By Oscar E. Perrigo. Pp. 343; illustrated. 7½x10½ in.; cloth, $5. New York, 1906: Norman W. Henley Publishing Company.

Contents—General plans. General construction of the buildings. Slow-burning construction. Slow-burning construction of brick and wood. Slow-burning construction of wood only. One-story machine shop of brick and wood. Sawtooth construction of roofs. Design and construction of chimney. The construction of foundations. The construction of floors. The system of heating and ventilation. The system of lighting. Power and transmission. Machine shop equipment. Planning the different departments. Equipment of the tool room and tool store room. The drawing room. The pattern shop and pattern storage room. The iron foundry. The forge shop. Shop transportation equipment. Miscellaneous equipment of the manufacturing plant. Machine shop management. The superintendent's office. The problem of apportioning the fixed charges. The drafting room. The tool and stock room. Pattern shop system. General efficiency in manufacturing operations. Machine shop mutual aid association. First aid to injured employees. Shop reading room. Shop dining room.

"Practical Coal Mining." By George L. Kerr. Pp. 504; illustrated. 5½x7¾ in.; cloth, $4. London, 1905: Charles Griffin & Company, Ltd.

Contents—The sources and nature of coal. The search for coal. Sinking. Explosives. Mechanical wedges, rock drills, and coal-cutting machines. Coal-cutting by machinery. Transmission of power. Modes of working. Timbering roadways. Winding coal. Haulage. Pumping. Ventilation. Safety lamps. Surface arrangements, coal clearning, etc. Surveying, leveling, and plans.

This is one of the most convenient treatises on coal mining that we have in English. It was first published in 1900. The present is the fourth edition, which is about all that need be said of the appreciation with which it has been received. Not many books require four editions in six years. In issuing this new edition advantage has been taken of the opportunity to give a thorough revision to the book. Over 40 pages of new matter have been added, and the whole has been rearranged. Mr. Kerr is a Scotch engineer and his book is naturally based largely on Scotch practice. This limitation does not, however, materially affect the usefulness of his book as an up-to-date treatise on the great industry with which it deals. We wish, however, that we had a similar work based on American practice.

"Elementary Practical Metallurgy—Iron and Steel." By Percy Longmuir. Pp. 269; illustrated. 5x7½ in.; cloth, $1.60. London, New York and Bombay, 1905: Longmans, Green & Co.

Contents—Refractory materials. Metallurgical fuels. Iron ores and their preliminary treatment. The blast furnace and hot-blast stoves. The work of the blast furnace. The metallic product of the blast furnace. The general properties of cast iron. Pig iron for the steel-maker. Cast iron in the foundry. Remelting cast iron. Malleable cast iron. Wrought iron. The cementation process. Steel. The crucible process. The bessemer process. The open-hearth process. The production of sound steel. Metallography of the heat treatment of steel. The metallography of hardened steels. Special steels.

Mr. Longmuir is a Carnegie research scholar and medallist of the Iron and Steel Institute. He states in his preface that much that has been written on metallurgy has served only to discourage the practical man, the matter presented not fitting in with the practice, and he has designed the present work primarily with a view to awakening interest, avoiding overloading with detail and presenting facts that are accurate and reliable.

He has succeeded in presenting a very valuable and thoroughly interesting introduction to the metallurgy of iron and steel, and we think has well fulfilled his purpose. His arrangement of the subject is good, and his style of expression is clear, concise, and at the same time excellent from the literary standpoint, which makes the book easy to read, and saves it from the tedious dryness characteristic of the ordinary text-book.

We were rather distressed by some statements relating to other branches of metallurgy, as for example the remark that "copper ores are considered rich at 25 per cent. metal, and are workable at 10 per cent.," and moreover the remark that sulphides of iron are not available for the production of iron, but these slips are too insignificant to cavil at, and the book is honestly commendable.

Professional Papers.

High Carbon Steel. F. Wüst. *Metallurgie,* Jan. 8, 1906; pp. 1-13; illustrated with diagrams and photomicrographs.

Liquation. K. Friedrich. *Metallurgie,* Jan. 8, 1906; pp. 13-25; illustrated with diagrams.

Iron Oxide, Reduction of, by Hydrogen and Carbon Monoxide. W. Wyss. *Metallurgie,* Jan. 8; pp. 26-27; illustrated by diagrams.

Lead-Arsenic Alloys. K. Friedrich. *Metallurgie,* Jan. 22, 1906; pp. 41-52; illustrated with diagrams and photomicrographs.

Zinc Alloys, Elastic Properties of. Oswald Meyer. *Metallurgie,* Jan. 22, 1906; pp. 53-59; illustrated.

Phosphorus, Influence of, on the Absorption of Carbon by Iron. F. Fettwers. *Metallurgie,* Jan. 22, 1906; pp. 60-62.

Electric Cables for Collieries. The Manufacture, Application and Distribution of. George G. L. Preece. *Iron and Coal Trades Rev.,* Jan. 26, 1906; pp. 287-290; illustrated.

Safety Lamp Gauzes and Flame Tests for Firedamp. J. Ashworth. *Iron and Coal Trades Rev.,* Jan. 26, 1906; p. 293; illustrated.

Lead Chamber Process, Recent Progress and a Discussion as to the Position of Fans. E. Hartmann and F. Benker. *Zeit. f. angew. Chem.,* Jan. 26, 1906; pp. 132-137.

Cancrinite-Syenite from Kuolajärvi and a Related Dike Rock. I. G. Sundell, *Bull.* de la Commission Geologique de Finlande, No. 16; pp. 20, with photomicrographs.

Mechanical Roaster, Kauffman's. *Metallurgie,* Dec. 22, 1905; pp. 574-576; illustrated.

Gold Dredging. A review of conditions in the dredging fields of the world. J. H. Curle. *Min. and Sci. Press,* Jan. 27, 1906, p. 52.

Fine Grinding. Denial of the necessity for fine grinding before leaching in many instances. Godfrey Doveton. *Min. and Sci. Press,* Jan. 26, 1906, p. 52.

Block Faulting and its relation to Ore Deposition. Exemplified by the structure of the Great Basin. Walter P. Jenney. *Min. and Sci. Press,* Jan. 27, 1906, pp. 54-55.

Gold Dredge. An exceptionally large one in use at El Dorado on the American river, Cal. George L. Hurst. *Min. and Sci. Press,* Jan. 27, 1906, p. 58; illustrated.

Manhattan, Nevada.

SPECIAL CORRESPONDENCE.

The boom is now in full swing. "Old timers" say it is the speediest boom the country ever saw. It is but little more than 30 days since it began and there are now about 3000 men in camp. Buildings are going up like magic. Town lots, sold for $100 a month ago, are now changing hands at from $1500 to $2500. The town is "wide open," and gambling continues day and night.

The principal mines are on the sides of a long gulch, running westerly. A half a mile north of town there are hills of tuff, full of fragments of shales and with small stringers of quartz. A reddish rhyolite formation flanks this tuff. The April Fool claims are in the town and lie on the north side of the gulch. The original discovery was made on this claim at a point within 100 ft. of road to Belmont, which has been traveled for over 30 years. Here a little visible gold was found in honeycombed material in hard blue limestone. Several sets of leasers work on this claim; the richest ore is a small streak in a ledge 22 in. wide; this streak shows abundant visible gold. The original ledge ran north and south, but east and west ledges have been found. Green and purple fluorite occurs in many of the veins of the district.

The best prospect in the camp is the Silver Pick claim of the Manhattan Consolidated Mines Company. A shaft 50 ft. deep and a 50-ft. crosscut from the bottom have developed a ledge 12 ft. wide, in limestone. The ore gives extraordinarily rich prospects in the pan. It seems as if the whole ledge would average over $100 per ton gold. Rich specimens have been found near here; one specimen showing nearly $200 in gold is supposed to have come from this ledge. This is certainly a very good prospect.

Some of the best claims in this part of the camp are in litigation and no work is being done.

The most extensively developed prospect is the Union No. 9, south of the gulch. A ledge has been proved here for 1500 ft., in shales. There are several sets of leasers. From No. 3 lease, eight tons of ore, shipped, returned $372 per ton: 40 tons from No. 14 lease netted $5700; in this lease the ledge shows 6 ft. wide for 50 ft. deep, and is said to average nearly $100 per ton. (All values given are in gold, and thus far the mines found are gold mines.) The Mustang and Broncho claims to the north of the gulch

show some ore; leasers are working on them.

Hundreds of locations cover several square miles. Much work is being done; blasts are heard every few minutes. Prospecting at present is chiefly confined to the southern hillsides: snow covering the northern exposures makes the work difficult. The deepest shafts in the camp are only 50 ft. deep. No systematic sampling has been done, and it is hard to get any idea of values. There is no doubt that valuable prospects have been found, and work being pushed vigorously will soon tell whether large bodies of ore exist or not.

Railroad Progress in Central Africa.

A recent reconnaissance has been made by Mr. Chas. Metcalf to determine the mineral and natural resources of the country through which the Cape-to-Cairo railroad will pass in its northward progress. The track has now reached the Kafue river, 260 miles beyond the Victoria Falls on the Zambeze, and is progressing at the rate of a mile per day. The Broken Hill zinc and lead district, 370 miles north of the Zambeze, will be reached by June, giving continuous communication from Cape Town to Broken Hill. The country around Broken Hill is well watered and has wide fertile valleys. From Broken Hill the railroad will probably take a due north direction to Bwone Macubwa, a point on the Congo border and the center of a rich copper area in northwest Rhodesia. This district is now being slightly developed by Europeans. The region here is open and hilly, and at an altitude of 4500 ft. enjoys cool weather. At one place copper ore has been taken out by two parallel open trenches 3000 ft. long, and green carbonate ores are found in abundance.

Copy of Letter Addressed to Our Compositors, December 21, 1905.

As is well known to all of you, the International Typographical Union has ordered a strike for January 1st, 1906, to inaugurate the eight-hour day, with nine hours' pay, and the perpetuation of the closed-shop rule.

Now, I have a few words to say to you, and as I do not wish to be misquoted or misunderstood, I have written them down, and any one of you can have a copy, if he so desires.

Those of you who know me, know that I am not myself opposed to labor unions. I am this moment still an honorary member of the best one in America—the Brotherhood of Locomotive Engineers—the great open-shop union.

This Company, and the whole fraternity of employing printers, could deal better with you organized than as individuals. You have rights as union men; but you must not forget that others have rights also—and this, I believe, your labor leaders have forgotten.

Those of you who know me, also know that I am inclined to pay more than the scale to good men, or grant them other privileges that amount to the same thing.

For seven years you had good wages—many of you over the scale—and were paid for every holiday, and did not work; you were paid for every Saturday afternoon, and did not work; you were paid when sick; and you were given a little vacation each summer and other privileges and emoluments which some of you at least will remember.

This was beautiful as long as it did not interfere with your union creed; but when I wanted to put a proof-reader into the place, who had been a faithful and efficient man in the office, and understood the technical matter handled by the new paper, the union stepped in and kept him out. Then, and not till then, did I commence playing the game according to the union rules. You lost $2,000 per year worth of free time to keep one man out of the shop. If you do not believe this, ask Mr. Gross, your Superintendent.

You and I, and all the rest, may have honest convictions, we may wrangle, and debate, and compromise on a question of hours or pay, but never on the question of the closed shop.

This imported, closed shop, that prevents young men from learning the trade; that restricts output; that keeps improved machinery products down; that forbids the owner of the plant from having his own foreman, or any other representative in the workroom—is in itself wrong. It is against the liberty of men. It is slavery. For me, it is the violation of a religious principle.

Too much power is bad for either capital or labor. But capital must obviously have some control of its property.

Your minds are probably made up on that question, and so is mine.

I want to say to those compositors who will walk out January 1st—that this composing room will open January 2d as a nine-hour, open shop. If you do not wish to man it, well and good; someone else will.

None of you is foolish enough to believe that you, or any other set of men, can, or will, do as much work in eight hours as you do in nine. If this *is* true, then are you doing the fair thing now?

The cutting down of the output of this plant one-ninth means more machinery or wasteful overtime.

Your union figures that the increase of cost will be 15 per cent. The Typothetae figures 23 per cent. At your own figures, this means a yearly increase to this Company alone of $11,900 for the same work you are doing now, and to the Typothetae of New York $594,000 per year. The printing business cannot stand it.

The compositors of New York have had an increase of pay since we went into business seven years ago of more than 30 per cent. Five times have they asked for concessions—and received them.

Prior to 1898, your pay was $3 per day—30 cents per hour. January 1st, 1898, the nine-and-a-half-hour day, ten hours' pay, went into effect, making your pay equal to 31½ cents per hour. November 2d, 1899, the nine-hour day was established, making your pay equal to 33 1-3 cents per hour. January 1st, 1902, your pay was raised to $3.16 2-3 per day, making it equal to 35 1-5 cents per hour. October 1st, 1902, the pay was again raised to $3.25 per day, making it equal to 36 cents per hour. Again on January 1st, 1905, the pay was raised to $3.50 per day, making it equal to 39 cents per hour.

Now, if your demands were to be met, the rate would be 44 cents per hour—a total raise of nearly 50 per cent.

You are going too fast.

Hereafter we shall pay the union scale, or more, for good men—union or non-union.

Nine hours is a very comfortable working time for clean, light, indoor work, where the owner furnishes all the tools, and has many thousands of dollars tied up in a plant. There is some excuse for the brick-mason's eight hours. He works at very dirty, heavy work, in all kinds of weather, making only an average of five or six months a year, and he furnishes his own tools. His employer has no expensive machinery idle when he quits early, and can always help himself by putting on more hands, and there is room for them.

The opportunity for individual initiative, the possibility for any workman to become a master, has made this country what it is in manufacturing and all other industries.

The closed shop means the changing of all this to the foreign standard, where a workman is always a workman, where ambition is still-born and hope is dead.

The open shop means the freedom of every man to do what he thinks best for himself, provided he does not encroach upon the liberty of others.

I am content to leave the door of opportunity wide open to all with ambition enough to enter. I oppose any attempt to close that door, to strangle ambition, or to prevent an abler man than I from earning more.

The American idea is good enough for me.

So far as I can learn, no single stockholder of this Company ever inherited a dollar. Each and every one of them commenced at the bottom and dug himself out.

This is not a corporation of greed, but a lot of men like yourselves, who have worked hard for what they have, and want to keep their own.

Their years of experience with this Company as workmen, as managers, as owners, have taught them that this closed shop is dangerous; that the eight-hour day is inopportune; that the union cannot run this plant.

Here are a few things I wish you would think about:

First—No printer ever succeeded in establishing himself in business who worked eight hours a day.

Second—There are very few, if any, composing rooms in this city that pay, even at the present scale—they are necessary evils that printers would be glad to get rid of.

Third—The price of composition is governed by out-of-town printers.

Fourth—Remember that this Company is willing to pay more than the scale—to pay men for what they do, not for what they belong to.

Fifth—That the closed-shop union tends to grade the workmen *down*, not *up*; it puts you all on the level with the average dub, and prevents you from earning what you deserve.

Sixth—That while we want only an open shop, with no outside control of what a man does, or what he *earns* above the scale, if you leave you oblige us to establish a non-union composing room until the war is over.

I shall be sorry to see a man go away—especially those who have been with us from the start. I do not believe that you can get better jobs or a more appreciative "old man." But this "old man" cannot stand everything. The savings of a life of hard work are in this concern, and all the fun he can get out of it is to run it his own way, with due regard for the rights of others. He always has worked more than eight hours a day, and always expects to.

If the officers of a labor union run this concern, someone else will own it—I won't.

Hereafter the foreman works for the owners, and not for the union.

I believe I know how most of you feel about working during a strike, and shall not ask you to do so. However, if any of you do want to stay, regardless of the union, I will make a three years' contract with you before January 1st; but not after you have once gone out.

And those who stay can keep on staying, union or no union, eight hours or nine, and I will put that in the contract.

In employing printers hereafter, one thing we shall insist on, and one only—that he be a good workman. We will not ask his pedi-

gree nor demand to know whether he be married or single, Methodist or Catholic, Democrat or Republican, union or non-union.

We want men who want to work here, and who are willing to give an honest day's work for an honest day's pay.

We want men who have common sense enough to know when they are being treated fair or ill, without being told.

Now the whole thing simmers down to about this:

You say to us—Shut down this plant another hour per day, pay the same wages that you do now, and place the conduct of the shop in the hands of our union and walking delegate, or we strike.

We say to you—We insist on our right to run our own concern nine hours per day, run an open shop, and employ whom we please. If that is the issue, go ahead—we will fight.

HILL PUBLISHING COMPANY,
JOHN A. HILL, President.

Questions and Answers.

Explosives for Special Conditions.

I intend prospecting for and working on quartz in British Columbia; where the temperature varies from —40 deg. to + 90 deg. I require explosives for sinking shafts, getting out rock, etc.; but as work is carried on for an uncertain time, and many months may elapse between periods of activity, dynamite is unsatisfactory. The location is over 250 miles from the nearest railroad and transportation slow, as a stock of say 500 lb. has to be kept. Can you recommend any high explosive to take the place of dynamite, simple to use, reasonable in price, safe to handle and transport; one that will keep indefinitely, or at least for some years, in such a climate without deterioration?

C. J. S. B.

Answer—We submitted the above inquiry to the E. I. du Pont Company, of Wilmington, Del., and obtained the following interesting reply:

Your correspondent propounds a rather difficult problem for solution when he asks for the recommendation of a high explosive to take the place of dynamite, which is simple to use, reasonable in price, safe to handle and transport, and will keep indefinitely in a climate such as that of British Columbia, without deterioration. The term dynamite, as used in this country, is rather a comprehensive one, as it is sometimes used to refer to all classes of high explosives, and in general is used to designate those high explosives containing nitro-glycerin as a base. In this latter sense there are several different kinds of dynamite, and some kinds would seem to us to fill the requirements of your correspondent. All explosives of this kind, however, freeze at a comparatively high temperature, and have to be thawed before using; but while such explosives should not be used in a frozen condition they can be thawed, and when properly thawed can be used in any climate.

We are manufacturing some explosives for use under conditions where dynamite does not work satisfactorily, and we believe that we have in one of these powders an explosive of about what is wanted by your correspondent. We term this our E. L. No. 4. We have not manufactured this explosive long enough to warrant our stating positively that it will meet the conditions under which your correspondent operates. We can only say that judging from the results we have obtained with it elsewhere, we think it would fill the bill. It is waterproof and, so far as we can tell, will keep and not freeze. It is lighter than ordinary dynamite, but bulk for bulk is about equal to an ordinary 33 per cent. dynamite. Weight for weight it is about equal to an ordinary 60 per cent. dynamite. It might not answer if the work is of such a nature that the fumes would be objectionable. For instance, if the work is close and without ventilation. It is, moreover, reasonable in price.

Patents Relating to Mining and Metallurgy.

UNITED STATES.

The following is a list of patents relating to mining and metallurgy and kindred subjects, issued by the United States Patent Office. A copy of the specifications of any of these will be mailed by THE ENGINEERING AND MINING JOURNAL upon the receipt of 25 cents. In ordering specifications correspondents are requested to name the issue of the JOURNAL in which notice of the patent appeared.

Week Ended February 6, 1906.

811,538. ELECTROLYTIC ELECTRICITY-METER.—Chas. O. Bastian, London, Eng., assignor to The Bastian Meter Company Limited, London, England. Filed Mar. 10, 1904.

811,552. PROCESS OF MAKING HYDRATED OXIDE OF LEAD.—James H. Bridge, New York, N. Y., and Carleton Ellis, Boston, Mass., assignors, by mesne assignments, of one-third to Sawyer, Foster and Hardy, Boston, Mass., a Firm. Filed Mar. 14, 1904.

811,609. COAL AND LIKE WASHER.—William E. Winn, Pittsburg, Pa., assignor to Heyl & Patterson, Inc., Pittsburg, Pa., a Corporation of Pennsylvania. Filed Feb. 18, 1905.

811,625. INSTRUMENT FOR GRAPHICALLY SOLVING SPHERICAL TRIANGLES ON A PLANE SURFACE.—Herbert H. Edmonds, Longueville, near Sydney, New South Wales, Australia. Filed June 13, 1905.

811,643. ROASTING-FURNACE.—Frank Klepetko, New York, N. Y. Filed Nov. 6, 1905.

811,671. CRUSHER.—Peter L. Simpson, Chicago, Ill., assignor to Herbert S. Simpson, Chicago, Ill. Filed Feb. 26, 1902.

811,679. CAGE FOR CRUSHERS AND PULVERIZERS. Milton F. Williams, St. Louis, Mo., assignor to Williams Patent Crusher & Pulverizer Company, St. Louis, Mo., a Corporation of Missouri. Filed Jan. 14, 1905.

811,683. DREDGE.—Frank Yoeman, Oroville, Cal. Filed Aug. 17, 1905.

811,685. ROCK-DRILL.—Thomas E. Adams, Cleveland, Ohio. Filed May 27, 1905.

811,706. APPARATUS FOR GENERATING GAS.—Byron E. Eldred and Carleton Ellis, New York, N. Y., assignors to Combustion Utilities Company, New York, N. Y., a Corporation of New York. Fled Feb. 21, 1905.

811,707. CYLINDER FOR TREATING HEATED METAL.—John F. Ellis, Torrington, Conn., assignor to The Coe Brass Manufacturing Company, a Corporation of Connecticut. Filed May 6, 1905.

811,709. JACK FOR STEAM-DREDGES, etc.—James G. Fairbanks and George L. Sauer, Marion, Ohio. Filed Nov. 19, 1903.

811,725. MEANS FOR SOLDERING ALUMINUM.—Arthur W. King, London, England, assignor to Charles Rogers, London, England. Filed Aug. 12, 1905.

811,759. ELECTRODEPOSITION.—William C. Arsem, Schenectady, N. Y., assignor to General Electric Company, a Corporation of New York. Filed July 25, 1904.

811,791. MEANS FOR OPERATING DRILLS.—Olin S. Proctor, Denver, Colo. Filed Apr. 29, 1905.

811,845. HYDROCARBON-GAS GENERATOR.—Leo Henderson, Peoria, Ill. Filed Mar. 6, 1905.

811,854. PROCESS OF TINNING OR COATING METAL SHEETS WITH TIN OR OTHER METALLIC COATINGS.—John Lee, Philadelphia, Pa. Filed Aug. 18, 1903.

811,860. BRIQUETING-PRESS.—Howard E. Marsh, Palms, Cal., assignor of one-half to William F. Wagy, Los Angeles, Cal. Filed June 27, 1905.

811,871. COAL-WASHER.—George S. Ramsay, St. Marys, Pa. Filed Oct. 10, 1903.

811,890. DOOR OPENER AND CLOSER FOR MINES.—Frank Zoerkler, Fryburg, Pa. Filed Sept. 16, 1905.

811,892. SAFETY- DEVICE FOR MINE ELEVATORS—Isaac M. Adams, Shenandoah, Pa., assignor of one-half to William Stein, Shenandoah, Pa. Filed Sept. 18, 1905.

811,893. SAFETY DEVICE FOR MINE-CAGES.—Isaac M. Adams, Shenandoah, Pa., assignor of one-half to William Stein, Shenandoah, Pa. Filed Sept. 25, 1905.

811,902. HYDRAULIC CEMENT AND PROCESS OF MAKING THE SAME.—Carle D. Clark, Clifton, Ariz. Filed Dec. 24, 1904.

811,905. WELL-DRILLING APPARATUS. Allen Craig and Edward Double, Los Angeles, Cal. Filed May 31, 1904.

811,943. ROCK-BORING MACHINE.—Willis C. Moore, Los Angeles, Cal. Filed Oct. 20, 1905.

811,946. CLAM-SHELL BUCKET.—John McMyler, Cleveland, Ohio. Filed May 22, 1905.

811,947. WELL-DRILLING APPARATUS. Ira L. Nelly, Independence, Kans. Filed Apr. 23, 1904.

811,952. GLASS-TANK FURNACE.—Julius Proeger, Greensburg, Pa. Filed Jan. 28, 1904.

811,989. GAS-REGULATING BUNSEN BURNER.—Charles E. Wirth, Waterbury, Conn., assignor to The Plume and Atwood Manufacturing Company, Waterbury, Conn., a Corporation of Connecticut. Filed Aug. 5, 1905.

812,000. ROTARY FOR OIL-WELLS.—Horace D. Bernard, Beaumont, Tex. Filed Sept. 18, 1905.

812,029. KILN.—Henry T. Epperson, San Francisco, Cal., assignor of one-half to George W. Clarke, East Liverpool, Ohio. Filed June 10, 1905.

812,065. GLASS-WORKING FURNACE.—Ira A. Milliron, Franklin, Pa. Filed Aug. 1, 1905.

812,083. SMELTING-FURNACE.—Allen R. Partridge, San Francisco, Cal., assignor by mesne assignments, to The Vencedora Mine Equipment Company, a Corporation of California. Filed Oct. 26, 1904.

812,084. COAL-HANDLING PLANT.—William J Patterson and Lewis J. Robb, Pittsburg, Pa., assignors to Heyl & Patterson, Pittsburg, Pa., a Copartnership. Filed Jan. 9, 1904.

812,135. MANUFACTURE OF HOLLOW METALLIC BALLS FROM SHEET METAL.—Allen Johnston, Ottumwa, Iowa. Original application filed Apr. 4, 1902.

812,147. APPARATUS FOR MOLDING MATERIALS WHICH SET BY THE ADDITION OF WATER THERETO.—John A. McConnell, Allegheny, Pa., assignor to McConnell Asbestos & Coverng Co., Pittsburg, Pa., a Corporation of Pennsylvania. Original application filed Apr. 27, 1901.

812,148. APPARATUS FOR MOLDING PLASTIC MATERIAL.—John A. McConnell, Allegheny, Pa., assignor to McConnell Asbestos & Covering Co., Pittsburg, Pa., a Corporation of Pennsylvania. Original application filed July 18, 1903.

812,170. APPARATUS FOR MAGNETIC SEPARATION OF IRON ORE.—Gustaf Grondal, Djursholm, Sweden. Filed Nov. 12, 1903.

812,171. MAGNETIC ORE-SEPARATOR.—Gustaf Grondal, Djursholm, Sweden. Filed Nov. 3, 1904.

812,172. MAGNETIC SEPARATION OF IRON ORE.—Gustaf Grondal, Djursholm, Sweden. Original application filed Nov. 12, 1903.

812,173. MAGNETIC ORE-SEPARATOR.—Gustaf Grondal, Djursholm, Sweden. Original appication filed Nov. 3, 1904.

812,174. METHOD OF MANUFACTURING IRON SPONGE.—Gustaf Grondal, Djursholm, Sweden. Original application filed Mar. 31, 1903.

Personal.

Milling and metallurgical engineers are invited to keep THE ENGINEERING AND MINING JOURNAL informed of their movements and appointments.

C. A. Wright, president of the Keweenaw Copper Company, is in New York.

E. M. Crabtree, formerly of Maiden, Montana, is now permanently at Douglas, Arizona.

J. B. Tyrrell has gone to Cobalt in Northern Ontario to inspect some silver properties.

Norman Carmichael is now connected with the Arizona Copper Company at Morenci, Arizona.

J. A. Milne has been appointed general manager of the Allis-Chalmers-Bullock, Ltd., Montreal.

John Herman is now general superintendent of the Keystone Copper Company, at Globe, Arizona.

O. A Warren is now mining engineer of the Cananea Mining Compnay, at Cananea, Sonora, Mexico.

R. R. Lesic, manager of La Colorado mine, in Sonora, was recently in Nogales, Arizona, on business.

C. B. Demster is now on his way to examine gold mining properties in Central America for Michigan investors.

Arthur W. Jenks is manager of the plant of the Transvaal Copper Mining Company, at Cumpas, Sonora, Mexico.

Jacob King, general manager of the New England Copper Mining Company, was in Clifton, Ari., on business recently.

R. K. Humphrey, of Denver, inventor of the Humphrey rolls, spent a few days in Butte recently. He left there for Idaho.

George A Baird, of Sharon, Pa., has succeeded Willard F. Snyder as president of the Western Exploration Company.

Rudolf Linden has returned from Alaska, and is now connected with the Shannon Copper Company at Clifton, Arizona.

W. P Snyder, president of the Shenango Furnace Company, has gone to Florida for a vacation of six or seven weeks.

E. Philip Gilman was in New York last week, on his way from Vancouver, B. C., to London. He sailed from New York Feb. 10.

J. Parke Channing, of the Tennessee Copper Company, has been in the Lake Superior country, after an absence of several years.

A. Amory, of Amory & Son, Boston, was in Butte on mining business Feb. 3. He went from there to the Bingham district of Utah.

Richard R. Wheeler, formerly at the Gold Cross mine in California, is now master mechanic at the Colorado mine in Sonora, Mexico.

Dr. H. E. Patten, instructor in physical chemistry in the University of Wisconsin, has accepted a position in the Bureau of Soils, Washington.

F. H. Clergue and A. P. Boller, of the Consolidated Lake Superior Company, were in Toronto Feb. 6, interviewing the Provincial government.

James Hoatson, of Calumet, Mich., president of the North Butte Copper Company, has been in Butte on business connected with the company.

James Breen, of Spokane, formerly one of the owners of the Breen & Bellinger smelter at Crofton, B. C., has been spending a few days in Butte.

Lewis H. Taylor, honorary president of the Taylor Iron and Steel Company, High Bridge, N. J., celebrated the ninety-fifth anniversary of his birth Jan. 29.

H. V. Winchell, geologist for the Amalgamated Copper Company, left Butte for San Francisco Feb. 5. He expected to be away from Montana about two weeks.

O. E. Jager, formerly at Copper Cliff, Ont., has been appointed metallurgist at the new smelter of the Transvaal Copper Mining Company, at Campas, Sonora, Mexico.

J. M. Callow, president of the General Engineering Company, Salt Lake City, Utah, has gone to Europe on business, and expects to absent himself about two months.

Ralph Baggaley, former manager of the property of the Pittsburg & Montana Company, has returned from Butte to his home in Pittsburg. He expects to be back in Butte in March.

W. W. Watts, professor in Birmingham University, has been appointed to the professorship of geology, at the Royal College of Science, London, vacant by the retirement of Proofessor Judd.

Francis C. Lincoln, mining geologist, has just returned to New York City from a professional trip to Santa Cruz county, Arizona, in the interests of the Arizona Gold and Copper Company.

W. H. Hugus, for 28 years superintendent of the Davidson plant of the H. C. Frick Coke Company, in the Connellsville region, has resigned, and R. C. Beerbour has been appointed to succeed him.

Charles O. Ellingwood, of Salt Lake, has been appointed general manager of the Western Exploration company in place of Willard F. Snyder, resigned. Mr. Ellingwood is also secretary and treasurer of the company.

Benjamin Magnus, formerly superintendent of the Anaconda electrolytric plant, and for two years past at the Calumet & Hecla plant at Buffalo, resigned Feb 15 to accept a position with the Mountain Copper Company, at the smelter at Martinez, Contra Costa county, California.

George C. Gill has resigned his position as president of the Shannon Copper Company, on the ground that he is unable to give sufficient time to the affairs of the company. W. J. Palmer has been chosen president of the company to succeed him. Meredith Hare, late counsel of the company, has been chosen secretary.

Norman L. Leach, who has been in the office of Jos. Sellwood, of Duluth, for some years, has been put in charge of the development of the Moose mountain, Ontario, iron ore deposits, which are owned by Messrs. Sellwood, Mackenzie & Mann, John W. Gates, and associates, and which are to be opened for mining this year.

Colin Campbell, a well-known Nova Scotia geologist, who has spent much time examining the district, expresses the opinion that the Laurentian Hills as far west as Lake Superior, and northwest to the Height of Land, when opened up by the Transcontinental Railway, will furnish a mining district equal to British Columbia.

Leslie Hill, of Nelson, B. C., manager of the Hastings (British Columbia) Exploration Syndicate, Ltd., of London, Eng., and consulting engineer to other mining companies, recently left British Columbia on a visit to New York, where he will meet some of the directors of the companies he is connected with. Mr. Hill recently made an examination of the Hewitt and Lorna Doone silver-lead mines situated near Silverton, Slocan district.

At a meeting of the Oliver Iron Mining Company at Duluth a few days ago. T. F. Cole was re-elected president, and W. J. Olcott vice-president; Pentecost Mitchell was elected general manager and J. H. McLean, assistant general manager; W. J. West was elected general superintendent of the company's mines in the Hibbing district, Minnesota, and D. E. Sutherland superintendent of its mines on the Gogebic range, while O. C. Davidson was elected general superintendent of both the Gogebic and Menominee districts. With the exception of Messrs. Cole and Olcott these are all promotions of the men in line for the various positions which has been the policy of Mr. Cole, in his management of the company. Mr. Olcott retires as general manager, to devote himself more particularly to executive duties. Mr. Mitchell had charge of the great Hibbing group of the company, which last year produced more than 5,000,000 tons, and where the duties of management have been severe and arduous, Mr. West has been his assistant in charge. Mr. McLean has been in charge of the Gogebic range, with its great underground mines, which last year produced more than 2,000,000 tons, and Mr. Sutherland has been his assistant. Mr. Davidson has been general superintendent of the Oliver Company's Menominee range mines since the organization.

Obituary.

The death is announced of Dr. Karl von Fritsch, professor of geology and paleontology in the University of Halle, Germany.

William G. Harris, an old Nevada pioneer, died at Dayton, Nev., on Jan. 16, aged 75. The deceased crossed the plains in the 60's and took up his residence at Dayton, where he remained until his death. He was interested in mining and milling in the Dayton district.

Societies and Technicial Schools.

Massachusetts Institute of Technology.—The late Frank Harvey Cilley, engineer, has bequeathed the residue of his estate, which will probably amount to $70,000, to the Massachusetts Institute of Technology for the purchase of suitable books, photographs, casts, anatomical models and statuary for the library and gymnasium of the proposed Walker Memorial gymnasium, or for special lectures on physical culture.

The Geological Society of America—The following have been elected officers of the Geological Society of America for the ensuing year: President, Israel C. Russell, Ann Arbor, Mich.; vice-presidents W. M. Davis, Harvard University; E. A. Smith, University, Ala.; secretary, H. L. Fairchild, University of Rochester; treasurer, I. C. White, Morgantown, W. Va.; editor, J. Stanley-Brown, New York City; librarian, H. P. Cushing, Western Reserve University; Councilors, H. M. Ami, Canadian Geological Survey; J. M. Clarke, Albany, N. Y.; J. F. Kemp, Columbia University; A. C. Lane, Lansing, Mich.; G. P. Merrill, U. S. National Museum; David White, Washington, D. C.

Iron and Steel Institute—The following circular has been issued from the office of the secretary, Bennett H. Brough, in London:

"The annual general meeting of the Iron and Steel Institute will be held at the Institution of Civil Engineers, in London, May 10 and 11, 1906.

"The council will shortly proceed to award Carnegie Research Scholarships, and candidates must apply before Feb. 28. The awards will be announced at the general meeting.

"In place of the ordinary autumn meeting a joint meeting of the American Institute of Mining Engineers and of the Iron and Steel Institute will be held in London on July 23-29. The Lord Mayor of London has consented to act as chairman of the London reception committee and will give a conversazione in the Mansion House on the evening of July 24. A program of the visits and excursions to be made during the meeting will be issued when the arrangements are sufficiently matured."

Trade Catalogs.

The following catalogs have been received recently:

Booklet No. 20, pp. 18, paper, 5 by 7 in. 1905.

Best Mfg. Co., San Leandro, Cal., Steam freighting machinery; pp. 32, paper, 7 by 10 in.

Colorado Iron Works Co., Denver, Colo. The testing of ores; pp. 12, paper, 7 by 10 in. 1906.

Allis-Chalmers Co., Milwaukee, Wis. Bulletin No. 1202. The Reliance friction clutch; pp. 4, paper, 8 by 10½ in, 1905.

Northern Electric Mfg. Co., Madison, Wis. Bulletin No. 32, Northern steel crane motors; pp. 16, paper, 7 by 10 in.

The Cyanide Plant Supply Co., 1 Broad St. Place, London, E. C. Supplement No. 13, The plants of the world; pp. 64, paper, 6 by 8 in. Dec., 1905.

Westinghouse Electric & Mfg. Co., Pittsburg, Pa., Circular No. 1107; Automatic circuit-breakers, carbon break; pp. 19, paper, 7 by 10 in. Dec. 1905.

Stromberg-Carlson Telephone Manufacturing Company, Rochester, N. Y. Bulletin No. 14. Private Branch, Telephone Exchange. Pp. 42; paper, 7 by 9 in.

Pacific Tank Co., 301 Market St., San Francisco, Cal. Catalogue No. 6, Cyanide tanks; pp. 192, paper, 5 by 8 in. July 1, 1904.

Jeffrey Mfg. Co., Columbus, O. Circular No. 73 A; Elevating, conveying and power-transmitting machinery; pp. 28, paper, 3½ by 6 in.

United Iron Works, 32 Fremont St., San Francisco, Cal. Folder 25; Eclipse pumps, pp. 10, paper, 6 by 9 in. 1905. Folder No. 27; French's automatic excavator; pp. 10, paper, 6 by 9 in.

The Denver Engineering Works Co., Shepard & Searing, 29th to 31st on Blake St., Denver, Colo. Rigid Rolls for Ore Crushing. Pp. 14, illustrated; paper, 8½ by 10½ in. January, 1906.

Geo. E. Woodbury, 223 First St., San Francisco, Cal. The Woodbury ore concentrators; pp. 52, paper, 6 by 9 in. Bulletin No. 6; The No. 5 Wilfley concentrator; pp. 16, paper, 7 by 10 in. Nov., 1905.

The Goulds Mfg. Co., Seneca Falls, N. Y. Booklet, Power pumps; pp. 32, paper, 4 by 7 in. 1904. Booklet, Fire pumps; pp. 8, paper, 4 by 5 in. General catalogue pp. 192, paper, 7 by 8 in. Supplement to General Catalogue; pp. 16, paper, 7 by 8 in. July, 1904. Supplement to General Catalogue; pp. 8, paper, 7 by 8 in. Nov. 1905. Circular; Gould's forked rods; 7 by 8 in.

Harron, Rickard & McCone, 21-23 Fremont St., San Francisco, Cal., and 164-168 N. Los Angeles St., Los Angeles, Cal. Catalog No. 4. Steam engines and Boilers. Pp. 127, illustrated; paper, 6 by 9 in. September, 1905. Catalog No. 5. Hydraulic Mining Machinery. Pp. 31, illustrated; paper, 6 by 9 in. July, 1905. Catalog No. 6. Huntington Centrifugal Roller Quartz Mill. Pp. 18, illustrated; paper, 6 by 9 in. November, 1905. Catalog No. 8. Fans and Blowers. Pp. 28, illustrated; paper, 6 by 8 in. July, 1905. Catalog No. 9. Wood-Working Machinery. Pp. 43, illustrated; indexed; paper, 6 by 9 in. February, 1905.

Industrials.

The general offices of the Ludlow-Saylor Wire Company have been removed to the factory on South Newstead avenue, St. Louis.

The American Steel Dredge Works, Logansport, Ind., organized by James P. Karr and John D. Rauch, now have the complete plant in operation.

The Roy & Titcomb Company, Nogales, Ari., is making plans for the enlargement of its plant. The company will open a new branch at Mazatlan, Sinaloa, Mexico.

The Washburn Company, Minneapolis, Minn., makes couplers for locomotives and cars of all kinds; also steel castings for railroad and general work. The company makes a specialty of break-down or rush work.

The South Baltimore Steel Car and Foundry Company has taken contracts to build 3000 steel hopper coal cars of 50 tons capacity; 2000 being for the Fairmont Coal Company and 1000 for the Somerset Coal Company.

The business of the Crocker-Wheeler Company, Ampere, N. J., during 1905 was not only greater than that of the previous year, but exceeded also the business done during 1903, up to that time the record year. The company has made remarkable progress during the past year in the alternating current field and has successfully built and marketed its line of core-type transformers.

The Portland Cement Company, Portland, Colo., has authorized an expenditure of $115,000 for improvements which will increase the capacity of its plant to about 1500 bbl. per day. The machinery included in the specifications, some of which has already been purchased, consists of a 1200-h.p. Corliss engine, 500-kw. generator, two Heine boilers, Wheeler condenser, Wainwright heater, pumps, hot wells, several Smith tube mills and electric motors.

The General Engineering Company announces its incorporation under the laws of Utah, with the following officers and directors: J. M. Callow, president; Jas. W. Neill, vice-president; Frank E. Johnson, secretary and treasurer; George M. Bacon and Frank P. Callow. The offices are located temporarily at Dooly Block until the completion of the company's building. The company will do a general mining, metallurgical, civil and mechanical engineering business; design and construct concentrating, smelting, milling and

power plants; furnish general and detail reports and estimates on all classes of engineering.

The slag cement plant of the Struthers Furnace Company, at Struthers, Ohio, is in full operation and the plant is operating very successfully. New machinery has recently been installed, which has considerably increased the capacity and added to the efficiency of the plant. The company has orders for all the cement that it can possibly furnish and is sold up for some time ahead.

With the recent purchase and addition of the Keyser Valley Rolling Mill to its former plant the Scranton Bolt and Nut Works has a capacity of 40,000 tons of bar iron per annum, which is considerably more than the entire anthracite field consumes. The surplus is distributed from New York, Philadelphia and Baltimore. The company now employs about 600 hands.

The Milwaukee Solvay Coke Company has been incorporated at Milwaukee, Wis., by Henry J. and Armin A. Schlesinger and Edgar U. Dickson, to act as the selling agent for the Milwaukee Coke and Gas Company in its local sale of coke for domestic use. By the middle of February the Milwaukee Coke and Gas Company will have its additional 80 ovens in operation, giving it a total of 160 ovens, with a daily capacity of 1200 tons of coke.

The Republic Iron and Steel Company, has recently completed the purchase of two additional Allis-Chalmers vertical, high and low pressure, long cross-head blowing engines for installation in that company's plant at Youngstown, O. These engines are practically duplicates of three others furnished them less than a year ago, two of the high-pressure and one of the low-pressure, vertical, long cross-head type. The new engines will have high pressure 52 and 96-inch and low pressure 96 and 96-in. steam and air cylinders with 60-in. stroke, each with a capacity of 45,000 cu.ft. of free air per minute.

J. J. Mendez & Co. have organized and established offices in the City of Mexico for conducting a general mining business. They undertake the purchase, sale and operation of mines; the organization of companies and the administration of the same; investigations and reports of all sorts upon mining lands and mining, milling and smelting operations; the acquisition of titles and concessions; the handling of mining litigations; and all commissions relative to the above which may be entrusted to the company. They also represent and sell mining, milling and smelting machinery and supplies, and furnish estimates, plans, etc., upon equipments and installations.

The Thomas Furnace Company of Milwaukee, has placed an order with the Allis-Chalmers Company for a new low-pressure, standard long cross-head type blowing engine. The engine will have steam cylinder 84 in. in diameter, air cylinder 84 in. and stroke 60 in.: the weight of the entire unit being approximately 175 tons. A feature of the arrangement of this engine in reference to two engines now installed will be in the connection of their exhaust piping to the receiver of the new unit, so that either may exhaust directly to the atmosphere. It is expected that the new unit will be ready for operation by March.

It is proposed to build a large portland cement plant at Leeds, 16 miles east of Birmingham, Ala. The site has been purchased, surveys made for buildings, foundations are being laid and grading begun. When the plant is ready for operation it will represent an investment of $500,000, and about 200 men will be required to operate it. It is the intention of the promoters to increase the capacity of the plant gradually to a daily output of 1800 barrels of portland cement. The country around Leeds is said to be adapted to the needs of the new enterprise, there being plenty of lime, shale, coal and water available. The Leeds plant will be owned and operated by the National Portland Cement Company, which is formed by an arrangement between the Carolina Portland Cement Company, of Charleston, S. C., and the Old Dominion Cement Company, of Staunton, Va. F. H. Lewis of the Staunton company and J. R. Hanahan of the Charleston company are actively engaged in completing plans for this project.

The Japan Information Bureau, 164 Yamashita-Cho, Yokohama, Japan, announces that it is prepared to undertake the supplying of information regarding commercial, industrial, shipping, mining, engineering, agricultural, forestry, fishery, railway, insurance, banking, educational, and any other Japanese subjects or affairs. The supplying of market or statistical reports of any trade or business or to act as regular business correspondent. The translation into Japanese of business circulars, documents, catalogs, or any other literature and the distribution of same among parties interested in Japan. The translation into English of any Japanese statistics, reports, official regulations, etc. The distribution in Japan of samples and catalogs of any merchandise and the getting of orders for same on commission. Buying and selling of any articles in Japan on commission. The collection of claims and arbitration of business disputes. The registration in Japan of patents, trade-marks, designs, copyrights, etc. The recommendation of agents or representatives for firms and manufacturers and their supervision. To make inquiries and report on the credit and business standing of any people in Japan. To establish connection between people abroad and in Japan for commercial and other purposes.

Construction News.

Snohomish, Washington—It is reported that the Bonito mine, in the State Creek district, will enlarge its mill from 10 to 40 stamps. A. W. Hawkes is superintendent.

Medical Springs District, Oregon—At the Indiana mine a cyanide plant and other improvements are planned for next summer. J. W. Messener, Baker City, Oregon, is manager.

Tintic District, Utah—The management of the Yankee Consolidated Mining Company is about to let a contract for an 100-ton mill. The plant will be built under the supervision of F. W. Sherman. L. A. Amsden, of Salt Lake, is manager of the company.

Little Cottonwood, Utah—The Intermountain Power Company, W. J. Craig, Atlas block, Salt Lake City, has called for bids to suply about 35,000 ft. of wood and steel pipe for a power plant to be erected in Little Cottonwood cañon, near Salt Lake City, during the present year.

Mammoth, Montana—The Minneapolis Company has bought the 100-ton roller mill on the Red Bluff property in Butte and will transfer it to the Mammoth mines in Madison county. The latter is in charge of A. C. Saunders, whose address is Mammoth, Madison county, Mont. It is likely that Mr. Saunders will make some additions to it.

Leadville, Colorado—Another magnetic separating mill will be erected in California gulch, Leadvile, by Mr. Burdett, of Boston. The site was selected on account of its proximity to water and electric power. Mr. Burdett is interested in the Fanny Rawlins, Breece hill, and the mill will treat the ores from the property first and, when caught up with, custom ore will be taken.

Cable Cove District, Oregon—Wheeler & Co., of 32 Broadway, New York, who are operating several mining properties in eastern Oregon have decided to erect in Cable Cove district, some 30 miles west of Baker City, a hydro-electric power plant on Baldy lake for the purpose of furnishing light and power to their Ophir & Sheridan groups, as well as neighboring mines.

Sumpter, Oregon—It is reported by O. C. Wright, one of the local representatives of Wheeler & Co., of New York, that W. E. Hurd and Anthony Mohr of Sumpter, are now in the East supposedly in New York, arranging the details for the construction of an electric railroad between Sumpter, Oregon, and the Bourne mining camp, a distance of 8 miles. The same parties are backing the Oregon & Idaho railroad, which was organized to build a line from Ontario, Oregon, through Payette Valley, 30 miles, in Idaho.

Special Correspondence.

San Francisco. Feb. 8.

At Oroville, the principal seat of the gold-dredging industry in California, the City Marshal has arrested several men running a dredge within the city limits, which is contrary to the ordinance recently passed by the new City Council. The dredge was kept in operation and the places of the men arrested were at once filled by others. Three of the men charged with violating the city ordinance appeared before Recorder Woodman on Saturday and through their attorney filed a demurrer to the complaint, which was promptly overruled and their trials set for next week. It is understood that writs of habeas corpus in their behalf will be asked for in the Superior Court in a few days, and that in any event the decision of the Superior Court as to the validity of the ordinance will be appealed from, thus bringing the matter before the Supreme Court. Both the city and dredger people will do everything possible to secure a decision as to the validity of the ordinance as soon as possible.

The Selby Smelting and Lead Company is having more trouble from suits due to alleged damage done by the smelter fumes near the plant on the bay shore near Vallejo Junction. Several new suits have been commenced within the past few weeks. In the Deming suit, considered in the nature of a test case, the judge of the Superior Court of Solano county has overruled the demurrer of the Selby company and holds that the complaint states sufficient cause for action.

The United States Court of Appeals has denied a new trial to Geo. W. Rumble, who was in May, 1904, convicted in the United States District Court for using the mails to defraud, and at that time sentenced to a fine of $500 and 18 months in the State Prison. He appealed and asked for a new trial, which this decision denies him, meantime being out on bail. He recently filed a petition in bankruptcy, with liabilities at $208,430 and no assets. The largest creditor is Dix W. Smith, of Elmira, N. Y., whom he owes, on judgment, $196,660. Unless Rumble makes an appeal to the highest court, he will have to undergo the sentence imposed over a year and a half ago.

Beach Thompson, H. P. Veeder and others, in close connection with the Stanislaus Electric Power Company, have secured control by purchase of the Tuolumne County Water and Electric Power Company and will incorporate the extensive system of this latter concern, it is understood, with the new $10,000,000 plant, for which the entire bond issue was underwritten in the East during last December. The consideration is in excess of $500,000, as the properties acquired are valuable and of considerable extent. The Tuolumne company owned very extensive interests on the south fork of the Stanislaus river and on the north fork of the Tuolumne river, together with more than 180 miles of ditches which convey the water from the streams and, after its utilization in generating power, distribute it throughout Tuolumne county. The Tuolumne County Water and Electric Company also owned six large and a number of small reservoirs, supplying the towns of Carters and Jamestown with water. It owned a 2500-h.p. hydro-electric plant near Phœnix lake, about six miles from Sonora, together with an extensive transmission system which supplies the mines throughout Tuolumne county with power as well as with water. Among other properties acquired is the famous Miners' Ditch, which was constructed in 1856 by an association of miners who owned claims in the vicinity of Columbia and Sonora. This ditch diverted its supply of water from the middle fork of the Stanislaus, at an elevation of about 5000 ft. above sea-level, and, after carrying it along the middle fork cañon for 20 miles, conveyed it by a tunnel 3000 ft. in length through the divide between the middle and south forks. From the tunnel the water was turned into the south fork and thus carried to Columbia and its vicinity. The construction of the Miners' Ditch was notable because the flume near the intake was carried for several miles on brackets along the sides of perpendicular cliffs, in some instances at hights of several hundred feet above the bottom of the cañon.

Up in Butte county the Valley Counties Power Company is making arrangements for the prosecution of extensive work on the power plant at Centerville, which will increase its capacity many-fold, as well as relieve it from the annoying stoppages which frequently occur during periods of heavy storms. At present workmen are engaged in preparing camps along the line of the old ditch, in each of which about 150 men will be housed, and as soon as these are completed laborers will be set at work. In a general way it is understood that the ditch for a distance of eight or ten miles will be so enlarged as to carry many times its present volume of water, and that the present system of acquiring energy through hydraulic pressure will be changed and that immense turbines will be installed instead of the Pelton wheels. There will also be new generators of larger capacity and improvements made in pipe lines.

Up in Nevada county, at Nevada City, since the last storm work has been resumed at the Home, Murchie, Blue Tent, Lecompton, Oustomah, Champion, and other mines. In the spring active work will be commenced on the Cold Spring gravel mine, while the Austin will also resume. It is expected that the Montana mine will be started, as well as the Mountaineer, Gold Flat and others. The old Deadwood is being re-opened, while the Banner is being worked systematically, the Noble & Floyd is being developed and the Neversweat will be working.

Articles of incorporation have been filed in Monterey county of the Stone Cañon Railway Company. The route proposed is from a point near San Miguel, San Luis Obispo county, on the line of the Southern Pacific, thence through the former and Monterey counties to a point on Nelson creek. The new road will be about 21 miles long and will give transportation for coal from the Stone Cañon mine, near Bradley. The mine has been worked in a small way for some years, but lack of transportation facilities has prevented large operations.

It is reported that the men who have bonded the Veign place, near the Honcut, Butte county, will soon put in a plant and pump out the old copper mine shaft and prospect it thoroughly. This shaft was sunk about 50 years ago, and tradition has it that rich copper ore was found.

The old Rademacher mine in Kern county is about to be reopened after years of waiting for a settlement of the estate of the owner, who disappeared some seven years ago and is now legally and, it is almost certain, actually dead. According to the Randsburg *Miner* a Mr. Osman, of San Francisco, son of one of the attorneys who was connected with the litigation in which the mine has been involved, has just been to Randsburg, preparing to start up work again, he having bought out the heirs. The mine is a very large low-grade proposition in El Paso hills, about 15 miles north of Randsburg. There is considerable development work on it.

J. H. Hunt and other creditors of the Canfield Gravel Mines Company, of Nevada county, have filed a petition in the United States Circuit Court to declare that corporation an involuntary bankrupt. They allege that it owes them $25,523, and that on Jan. 24, 1906, it committed an act of insolvency by admitting in writing that it was unable to pay its debts.

The Bonanza King Development Company, of Los Angeles, is preparing to install a 10-stamp mill at the mine in the Providence mountains of San Bernardino county, which it acquired some two years ago and has been working since last September. The chief effort has been devoted to developing necessary water, which has now been accomplished. The mill is expected to be running by May 1. The mine was formerly owned by Eastern capitalists, who worked it to a depth of 500 ft. In 1887 their mill was burned, but they continued their work for several months when the principal stockholder became insane and litigation followed, forcing a shutdown. Two years ago it was adjusted and the property sold. There are about three miles of underground workings. The company is owned by 10 Los Angeles people. The officers are: J. H. Montay, president; C. W. Cuddagan, vice-president; and Dr. C. E. Usscher, secretary and treasurer.

Bisbee. Feb. 9.

The Copper Queen and the Calumet & Arizona companies are preparing to make up a geological map of the district, to supplement the maps issued by the Government a year or two ago. They will have engineers in the field, and the maps will show a very material change.

The serious situation as to coke for the smelters and mines here is somewhat relieved, though it is still bad. At the mines there is not so much fear, aside from a few localities where coal was used, and where wood is now depended on. At the Denn and some other new developments the wood supply is short, and they are burning mesquite, greasewood and sage brush, in fact, everything that will make heat. Most of the mines use oil entirely, and are not troubled. The chief difficulty in this region is at Tombstone, where the Consolidated company must have steam, and is out of coal. Its pumping and general progress depend upon constant steam, and if the fuel supply gives out there will be an expensive job; but the company has been able to maintain fires and the crest of the trouble is now past.

Daily shipments from the Copper Queen mines have averaged better than 1200 tons for some time, and are to be increased during the present year. Much of this increase will come very soon. It is probable that during February the daily production will reach 1700 tons.

In December the Hoatson shaft of the Calumet & Pittsburg was driven 162 ft. This is a very rapid record, as the shaft is four compartment and through crystalline lime most of the way. It is now about 850 ft. deep. The nearest opening is that of the Lowell mine of the Copper Queen, which first cut ore at 850 ft., but did not get into any important bodies before 1000 ft. The Hoatson has already cut small copper streaks and stains, and is not expected to get good ore much under 1000 ft., if as soon. The station being cut on the 1138-ft. level of this company's original shaft is nearly completed, and drifting will be under way in a very short time. This mine is now making about 2200 gal. water per minute, which is a slight decline from the average of the past two years.

Shattuck is now shipping its small stock of ore, and its daily hoist, won in the progress of development, to the Queen smelters and will be a reasonably steady producer. It has not bought its aerial tram, which is to be 3000 ft. long, and on an 18 per cent. grade to the tracks. Makers of various styles are to be here shortly to submit proposals. It is probable that the company will have a retarding engine on the tramway. A large permanent hoisting engine will be ordered in a few days.

The American Mining & Development Company, working on the side of San Juan mountain in this valley, has made a rich strike of gold-bearing ore, and engineers have recommendde the company to install a 40-stamp mill, instead of the 10-stamp now going in. The ore recently cut averaged about $20 a ton.

The Arizona Copper Company is to change the course of its slimes. In order to do this it will build a new concentrator near the smelter of the Detroit Copper Company, and erect a great retaining wall, behind which the slimes will settle for years without getting into the river and causing trouble with ranchers. There is great activity in the Morenci and Clifton camps, where this company is located, and it is expected that the entire camp will before long be supplied with cheap power from a point 50 miles away, where a dam is to be built, and from which electricity will be conveyed.

Socorro, N. M. Feb. 9.

The recent purchase for $18,000 by the United Verde Co., of Arizona, of a job lot of the machinery of the defunct Albemarle Mining Co. in the Cochite district of Sandoval county, recalls a short lived boom. A Boston company acquired the Albemarle claims in the late nineties and forthwith installed a 300-ton cyanide plant and a 35-mile electric transmission line from the coal mines at Madrid. They operated the mill 2½ years and produced some $600,000, but the "low grade" surface ore got down to $3.50 a ton with depth, causing a shut-down in 1902; a dismantled plant, a 45-deg. incline of 700-ft. depth and a deserted village are all that now remain to tell the tale.

The Deming custom lead smelter in Luna county is now in operation, and is stimulating the lead ore production of the tributary country, especially at Chloride Flat and Bald Mountain in Grant county. Mr. C. B. Bosworth of Deming recently bought the Eureka mine near Central and will shortly begin work on its two silver-lead veins; accessory zinc minerals will now be readily saleable.

The copper regions of Grant county are lively. At Burro Mountain, H. F. Merritt, representing Duluth iron men, has been securing options on promising claims. The Burro Mountain Copper Co. has recently remodeled its concentrator with the twofold object of reducing cost and making a better saving, and has extended its territory by acquiring seven new claims, including the Irish Gray, the Stella, the Night Hawk, and the I. C. The Santa Rita Mining Co. is responsible for the bulk of the car of ore that leaves Santa Rita daily; it is driving eight drifts from its No. 8 shaft of 200-ft. depth and employs 200 men. The best claims of the departed U. S. Gold and Copper Co. were jumped on New Year's Day. At Malone, the International Gold Mining and Milling Co., of which D. M. Sinclair is president, seems to be recovring its financial health and proposes to recommence mining shortly.

The Lost Chance property at Pyramid has been sold to the Aurora Mines Co., of Illinois, and will soon be re-opened. This is one of the old-time producers, and shipped much smelting ore to Socorro and Pueblo before its shut-down in 1884. In the Virginia district, some strong copper companies are now operating; among them are the American Consolidated, the Aberdeen, the Superior, the Michigan-New Mexico and the North American. Col. S. L. Bean is expecting to build a mill for his claims in the spring.

The Comanche Mining and Smelting Co. is taking the lead in new work in Grant county. Besides extensive developments at the mines at Pinos Altos and Burro Mountain, it has partially completed a narrow-gage railroad from Pinos Altos to Silver City, and plans to build a similar line from the latter town to Burro Mountain. The company has a smelter with a 250-ton blast furnace, the largest in New Mexico; and there are machine and car shops and a foundry in connection. The new concentrator will have, when completed, a daily capacity of 400 tons and will save zinc as well as lead, copper and the precious metals. A central station, generating 600 h.p. by steam, will furnish electricity to run the various reduction works. Besides its own ore, the company will purchase custom ore and thus will do much to stimulate mining around Silver City.

In Sierra county the long stupor of Hennosa camp was only a trance after all, for the Palomas Chief Mining Co. is rapidly restoring animation by re-opening one of the old producers, the Palomas Chief silver mine. The Union Esperanza Co., operating placer claims near Shandon, has just put in, near the mouth of Apache cañon, a large pumping plant, to drive water two miles through an 8-in. pipe, to give a 400-ft. head for hydraulicking. The underflow of the Rio Grande is being tapped at a depth of 60 ft. by the Shandon Mining Co., which burns seven cords of wood daily in driving a centrifugal pump to force this water two miles to a cement reservoir, situated 150 ft. vertically, above the gold gravel.

Goldfield, Nev. Feb. 5.

City improvements are keeping pace with mining industry here. The main streets are now being dug up for the installation of a sewer system. At the same time water pipes are being laid which will more than double the amount of water now available for domestic purposes, and will offer protection from fire, which the camp has not enjoyed before. Fire hydrants will be set at the principal street corners. The water is to come from the Highland mine in Diamondfield, from which it is pumped by electric power. A 150,000-gal. steel tank is now under construction on a hill southwest of town,

which will be used for the storage of the water.

The companies which are now availing themselves of the electric power furnished by the Nevada Power Mining and Milling Company are the Combination Mines Company, which uses the power both at the mine and mill; the Highland mine of Diamondfield, which has an electric hoist and pumping plant; the Florence mine and the Peer & Pugh lease, both of which have hoists; and the January mine, whose hoist is now being installed. In addition to these are all of the custom mills in town, except one.

The Kinkead mill, the construction of which commenced in November, is about completed. The mill consists of three Kinkead mills and amalgamating plates, three Frue vanners and a canvas plant. The mill is neatly constructed in every particular, and is so designed that additional units may be added at any time in the future. The mill is to be run by electric power. Water for milling purposes is to come from Diamondfield through a 5-in. pipe-line which was laid some time ago. Foundations are now laid for two tanks which are to be used for water recovery; as soon as these are ready the plant will be complete, and will no doubt commence crushing ore in the near future. H. Kinkead will act as superintendent.

Work on the Daisy mine in Diamondfield is progressing under the management of Roy Ridge. Ore has been encountered on the 60-ft. level and is being sacked for shipment. The Daisy shaft is now down 100 ft., and drifting is in progress on this level to cut the orebody worked above.

G. S. Potter, manager of the Nevada-Goldfield Reduction Company, has returned from Salt Lake City, accompanied by W. E. Dowlen, of Paris, the consulting engineer of the company. The company's mill, commonly known as the Frank mill, is to start in a few days.

Last Monday the vein was tapped in the cross-cut on the 250-ft. level of the Peer & Pugh shaft on the Cornishman claim of the Florence property. The values at this point are said to average $16 per ton and carry some sulphides.

Work is now progressing on the ground formerly operated by Doherty Brothers on the Florence claim. Considerable timbering has been done in the shaft, which is now 100 ft. deep, and sinking will be continued until a depth of at least 150 ft. has been gained. A cross-cut is then to be run with hopes of encountering the famous Reilly ledge. The property is now being operated by Messrs. McKay, Lindsay and associates.

High-grade ore was struck on the 165-ft. level of the Red Top mine Feb. 3. The ore is a continuation of the shoot which has been worked for some time on the 100-ft. level. The Red Top Company is daily hoisting ore of varying grades for shipment. It is said to be the intention of the company to declare a dividend this month.

The controlling interest in the Great Bend Mining Company has been purchased by Loftus & Davis and the property will now be run under their management. The deal was closed last Thursday, when 600,000 shares of stock were taken over and the company reorganied. The property is located in the Diamondfield section northwest of the holdings of the Goldfield Daisy Mining Syndicate.

The Marinette & Nevada Mining Company. which is operating its property four miles from Klondike Wells, has shipped 77 sacks of ore to Goldfield in care of the company's vice-president, J. O. Landem. The idea of the shipment was to have the ore thoroughly sampled and tested. The ore carries high values in silver, and a small amount of gold, lead and copper.

Denver. Feb. 9.

The annual report of the United States Reduction and Refining Company makes a very favorable showing. It shows that the net earnings were $471,116 compared with $339,337 the previous year. A surplus of nearly $300,000 is on hand. In order to enable the company to carry heavier stocks of ore, the working capital will be increased and work will at once be commenced on the construction of an additional plant under the direction of J. D. Hawkins, the general superintendent, this uew addition to cost in the neighborhood of $200,000, and to have a capacity of about 800 tons of tailings per day.

The published reports that the Philadelphia plant of the American Smelting and Refining Company, at Pueblo, had resumed operations, is only true to the extent that, in order to help out the Eilers and the Pueblo plants, where extensive changes are in course of progress, a few furnaces have been placed in commission temporarily.

The local mint has at last commenced coining operations. During the month of January the receipts of gold amounted tc $2,303,523, which showed an increase of nearly $200,000 over the same period last year.

During the past month more than 200 carloads of ore and concentrates containing about 4500 tons, were shipped from Black-Hawk to the smelters, showing continued activity, considering the season of the year. Creede sent out nearly 7000 tons. The Commodore mine in that camp, which is now being worked on lease, is doing well.

The Colorado Fuel and Iron Company is making extensive improvements at the Chicago Iron mines, near Sunrise, Wyoming, and shipping large quantities of ore to the plant at Pueblo.

A meetmg of the business men of Central City was held a few days ago, when a proposition was submitted to them by the representative of an Eastern syndicate to furnish the money for the continuation of the Gilpin & Clear Creek District Railway, to be built from Central City to Pactola on the Denver, Northwestern & Pacific Railroad. The proposition was made to have the citizens subscribe $125,000 toward the cost of the line, which will be about 25 miles long, and the estimated expense of construction will be about $600,000. It would furnish a broad-gage line to Denver. The Colorado & Southern narrow gage system furnishes the only means of transportation at present. The City Council of Denver, without a dissenting vote, has granted the Moffat line a temporary permit to enter this city, pending the opportunity to have the people at the next election decide on their request for a 20-year franchise, and construction on their new depot site will at once commence.

Leadville. Feb. 10.

The tonnage for the month of January amounted to 79,000 tons of all classes of ore, which was a slight increase over that of December. The outlook for the whole district is bright, as hardly a week passes but some new orebody is caught; in many instances this happens in the old mines, and the large producers are keeping up the regular monthly tonnage. When the manganese ore starts to be moved the tonnage will be materially increased.

Gradually the ground toward the head of South Evans gulch is being brought into the fold, and the last group of claims to start up is the Hattie Clark, which adjoins the Alps. A new shaft will be sunk to the west of the fault that is in the section and will be sent down 750 ft., when it is expected that the orebodies will be caught. The property has been leased to Pennsylvania parties and the work of development will be pushed.

Ball Mountain still continues to attract the prospector, as well as the investor, and during the week the strike that was made in the Ball Mountain claim increased the interest in the section. William Inglis, with his partner, was the man that opened the body of ore in the Sunday, and when his lease expired on that property he took a lease on the Ball Mountain, and after working on a small streak for several months, caught a vein of ore 3 ft. wide that runs high in silver, with some gold. A strange feature is that the rock alongside of the vein runs $10 per ton, in gold principally.

During the winter months the Sunday mine will simply do development work, and the ore that is being broken is sent to the smelter; by spring enough ground will be opened to keep the mine busy stoping. Alongside of the high-grade body of ore there is a quantity of low-grade ore carrying 20 per cent. zinc and some lead values; this is being stacked on the dump for future use.

The Tiger tunnel, which is to the south of the Sunday, is now in several hundred feet, and for the last 200 ft. the ground has been extremely hard; during the last few days the ground has become softer and it is expected that before long the main vein will be caught. The tunnel has been driven on a small vein that carries high values in gold.

During the week James B. McDonald, a well known and practical miner, took charge of the New Monarch group of claims, to succeed Timothy Goodwin, who disposed of his interests in the property. The mines, five in number, are in good physical condition, and the new superintendent will continue to ship the regular quota of ore and at the same time develop the ore channels in virgin territority.

The Lou Dillon shaft, on the Iowa gulch side of Ball mountain, is beng sunk and when the requisite depth is gained a cross-cut will be started to the west to cut the veins that trend through this section. The Helena, which adjoins the Dillon, a few years ago shipped $75,000 worth of mineral from the upper workings, and it is expected that the cross-cut to be driven will catch this ore-shoot at a greater depth.

The Murphy shaft, Rock hill, has now reached that stage when all doubts as to its being only a prospect have passed, and from now on it will be listed as one of the regular shippers. The work done on the lower levels has opened a body of lead-carbonate ore from which 800 tons per month can be shipped, and as the drifts are being driven to the end-lines the ore holds good. The Bessie Wilgus is upraising and drifting on the western course of the ore-shoot, and making air connections.

From the upper workings of the Silent Friend, South Evans gulch, a heavy tonnage of good ore has been shipped, and the lessees have now decided to sink the shaft another lift to get to the sulphide zone. The work has been started.

Cripple Creek. Feb. 10.

Practically all of the leases on the Last Dollar have expired and the property will be run on company account. For the past two years the mine has been worked almost wholly by lessees, most of whom have done well. It is understood that there is considerable ore in sight for the company to commence work upon.

It is understood that the blocks on Stratton's Independence, Ltd., are to be made smaller, and therefore the number of lessees increased. A good deal of ore is being shipped from this property by the lessees.

The new compressor has been put in place at the Forest Queen and shipments have been resumed. The property has not been doing much work for the past week or two on account of putting in the compressor, and repairing the boiler.

The annual report of the Cripple Creek Consolidated Company shows the affairs to be in a fair condition. No work is being done by the company, all the operations being conducted by lessees. The principal lease at present on the property is that operated by John Sharpe on the south end of the Colorado Boss No. 3, which yielded during the year $10,234 in royalties. Together with the cash in the treasury the total receipts of the company amounted to $21,195. A dividend of ½c. per share was paid during the year, amounting to $9951. The amount of cash in the treasury on Dec. 31 wasc $9616.

Good headway is being made on the McKenzie shaft of the South Burns of the Acacia Company. This property is being worked under lease by the Standard Mines and Development Company.

It is understood that the El Paso will soon begin pumping again, having nearly reached the point where the C. K. & N. vein will be cut on the 1,000 ft. level. In all probability, when this is done some of the other mines in the vicinity will be able to resume work, which can not now be done on account of the water.

Butte. Feb. 10.

Fire destroyed the concentrating department of the Butte Reduction works, a Clark asset, last week, entailing a loss of about $150,000, but the accident has not interfered greatly with the operation of the smelter. Since the fire the company has been shipping between 500 and 600 tons of ore a day to the Washoe plant and smelting its higher grade in its own plant. Of 75 tables in the burned concentrator, all save two were saved. The rolls, jigs and elevators were burned. The plant is to be rebuilt as soon as possible, the ground having been almost cleared.

The North Butte hoisting engine, the breaking of which necessitated a greatly curtailed output, has been repaired in much shorter time than was anticipated. The company is now raising about 1000 tons of ore a day. The new hoisting engine, made by the Nordberg Machinery Company, of Milwaukee, has been shipped and is expected to reach Butte within the next three weeks. The foundation is ready to receive it.

Butte Copper Exploration and Butte & London Copper have begun work on their properties east of the city. The former has eight claims, on two of which considerable development has been done, one, the Golden Chief, showing a 30-ft. vein of 2 ½ per cent. copper ore. Butte & London is undertaking a job the outcome of which is problematical. It is sinking in ground that is almost level and is covered by a sand and gravel wash of undetermined depth. A few hundred yards south of the point where the sinking is in progress this wash is from 400 to 600 ft. deep. No other work has ever been done on the property.

The West Butte Mining Company entered the field last week. It has a capitalization of $200,000. So far it controls one claim, the Columbia, but hopes to secure more.

Amalgamated is now sending about 8350 tons of ore from Butte to its Washoe plant. Of this quantity, 1000 is from the North Butte, 550 from the Clark mines and 300 from small claims under lease.

Pittsburg & Montana mined and treated 4988 carloads of ore last month, a total of 5000 tons. It has suspended work in shaft No. 1 for the present. Reins Copper has its shaft down 1070 ft. and is sinking at the rate of 2 ft. a day. It is going to the 1200 before starting a crosscut. Raven has driven six raises on the 1200 since Jan. 1, all in ore. It is now driving from the 1500-ft. station of the Buffalo and expects to cut the first of three veins in the Snoozer inside of another 150 ft. The face of the cut is in 110 ft. Negotiations for the consolidation of the property of the Silversmith Company and the Goldsmith mine are under way. Both are old-time silver producers. In 1904 the operator of the Goldsmith paid the owner of the property $98,000 royalty and afterward bought the mine.

Salt Lake City. Feb. 9.

The mines of Utah paid to shareholders during the month of January a total of $1,473,500, the distributors and respective amounts being: Utah Consolidated, $750,000; United States, $555,000; Silver King, $100,000; Horn Silver, $20,000; Beck Tunnel Consolidated, $15,000; Grand Central, $12,500; Victoria, $7500; Uncle Sam Consolidated, $5000; Sacramento, $5000; Mountain View, $2500; Utah, $1000.

E. A. Wall, the former owner of the ground operated by the Utah Copper Company in Bingham, and the present holder of about one-fifth of the stock of that corporation, has addressed two letters to President Charles M. McNeill in which he declares that the milling operations of the company in the past have not been a success, and alleges, among other things, that the company is losing values to the amount of $40,000 monthly. He also makes the statement that if the plans decided on some time ago for the construction of the new Garfield plant, as relates to methods of ore treatment, the plant will not be a success and the several millions of dollars that are to be spent in improvements will be wasted.

At the recent meeting of Utah Copper shareholders, held in Jersey City, a new board of directors was chosen which organized with the re-election of Charles M. McNeill, president; D. C. Jackling, vice president and general manager; Spencer Penrose, secretary and treasurer; John Hays Hammond, managing director; A. Chester Beatty, consulting engineer. In his report to the stockholders, President McNeill had the following to say:

"Except to a small degree, it has not

been found necessary to waste any material whatever from the mine, everything encountered in the development having been of a profitable working grade. Certain drill holes have been made at various points in the property to a depth below the tunnel level, which indicate continuous orebodies of a profitable grade existing at very much greater depth, and while the developments at the present time have been very extensive, they have not disclosed the limits of the orebody, but what has been done, taken in connection with conditions which are apparent and the results of the drill holes above stated, would indicate the existence of an enormous orebody.

"The average assay of some 6000 samples, taken during the period referred to from the various portions of the mine under development, is so nearly identical with that of the average ore sent to the mill during the year that it can be stated that a fair average value of all ore developed is 1.98 per cent. copper, and the average assay value of gold and silver is 0.016 oz. and 0.15 oz. per ton, respectively."

At a special meeting of the shareholders of the Mammoth Mining Company, the articles of incorporation were so amended as to extend the life of the corporation 25 years.

There are plenty of rumors in circulation to the effect that there will be a consolidation of the Ontario, Daly West and Daly at Park City. While it is a fact negotiations have been pending for some time, a consummation of the deal is hardly probable within the early future.

Increased activity is being noted in the State Line mining district. Recent development in the Sidewinder property there has exploded the theory that gold values do not predominate on the west side of the porphyry dike cutting through the camp. The ores are low-grade, but some extensive bodies are being opened.

The new Gold Butte district in the extreme southeastern corner of Lincoln county, Nevada, is attracting quite a little attention in Salt Lake, because of the discovery of some gold and copper ledges there. Mining engineers who have been in the district in the past few weeks say it looks good.

Platteville, Wis. Feb. 10.

One of the most disastrous fires on record in this district occurred recently at the power plant belonging to the Hazel Green Mining Company. A complete equipment of concentrating and separating machinery had just been installed, which fortunately escaped destruction. The fire occurred just as the ground crews were changing shifts and very few were underground. One or two men were slightly burned trying to put out the fire, but no one was seriously injured. The large lift pumps fell to the bottom of the shaft, as also did the hoist. The generators, compressor and large Corliss engine are reported as being completely ruined. The property was partially covered by insurance. The management has given a contract for the immediate rebuilding of the plant. As noted in the JOURNAL, the Hazel Green mine was producing the highest-grade ore in the district, averaging 63.6 per cent. zinc. The daily output for the short time the separator had been in operation was about 20 tons per shift. The contractors agree to have the new plant in operation inside of 45 days.

O. A. Rogers, of Pittsburg, vice-president of the Wisconsin Zinc Fields Mining Company, is in the district. The company has just purchased a prospect drill and is making arrangements to begin operations at once on its 400-acre lease, near the Big Patch camp. While here Mr. Rogers secured several hundred acres more in leases for himself and associates at Pittsburg.

A new company has been organized to operate the property adjoining the Baxter, in the Cuba City camp. The stockholders are all residents of Janesville, Wis. The Baxter mine, which is owned by five of the leading business men of Janesville, is reported as paying the owners a profit of approximately $600 per day on an investment not exceeding $10,000. The owners are making preparations to double the capacity of the concentrating plant. It is also reported that as soon as spring opens up a new mill will be erected.

The Dawson Mining Company, located near the Benton camp, has changed its plans as to installation of power. It has been decided to install a 150-h.p. Corliss engine and distribute the power electrically. A contract has also been let by the same company for a roaster and magnetic separating plant of the Galena type as generally installed in the district.

Work on the new concentrating plant for the Slack mine near the Mifflin camp will be started at once. The development work that has been carried on for some time at the Slack has opened a good range.

A good strike of zinc and lead ore is reported by the Peacock Mining Company, which is drilling in the vicinity of the Slack mine at the Mifflin camp. It is supposed to be a continuation of the old Squirrel range. The ore is of a disseminated nature.

The burning of the Hazel Green pumps is the direct cause of the shutting down of the King Bee's new concentrating plant. The pump helped to keep the King Bee water down.

Scranton. Feb. 12.

Great secrecy has been maintained in connection with the meeting of the miners' scale committee in Wilkes-Barre, where the demands of the mine-workers are being formulated, but it is reported that the following demands will be made to the operators: (1) A trade agreement including the recognition of the union. (2) An eight-hour day for the company hands. (3) Uniform scale for rock, slate, water, and all kinds of dead-work. (4) An improved conciliation board. (5) A slight increase in wages for all classes. (6) The weighing of coal instead of payment by the car. Of all these it is thought that the struggle will be made over the claim for the recognition of the union and the eight-hour day.

A surprising increase was shown in the anthracite tonnage for the month of January, the total being 5,458,084 tons as against 4,408,578 in January, 1905. The tonnage for February will be less, as a number of collieries have been idle.

Notices have been posted at No. 18 colliery of the Lehigh & Wilkes-Barre Coal Company, that it will be closed until further notice. Operations have been resumed at the Mary D colliery, Tuscarora, where the breaker was destroyed by fire some time ago. The coal will be stocked until the new breaker is completed.

The Silver Brook colliery is closed down, the mules having been taken out of the mine. There is a report that the property will be purchased by the Philadelphia & Reading company.

Extensive developments are being carried out in the Harleigh colliery, Hazleton, which was recently purchased by the Madeira Hill Company. Two new gangways and a tunnel are being driven. The breaker is also to be enlarged. The sum of $55,000 was paid for the colliery.

James G. Harvey, of Conyngham, who has been prospecting for coal at Hazel Park, near Hazleton, has found a vein and will soon begin the sinking of a shaft. It is believed that the entire strip between Hazel Park and the top of the Conyngham mountain will eventually be worked for coal.

Water is pouring into the Clear Spring mine, West Pittston, and it is thought that it is flowing from the Susquehanna river. Three pumps, including two 12-in. Jeansville pumps, have been installed, in the hope of preventing the colliery being flooded.

Application has been made to the courts in Luzerne county for the removal of two members of the miners' examining board, who, it is claimed, are disqualified for the reason that they are no longer practical miners. One, it is said, has been selling lubricating oil for some time, while the other is a foreman, and not within the words of the act, "a miner actually engaged in the said business."

The new coal briquette plant in Dickson City, near Scranton, was destroyed by fire last week. Operations were only begun there recently.

The second series in the course of lectures arranged by the Philadelphia & Read-

ing Company will be as follows: Arthur Laidlaw, of the Compressed Steel Company, Detroit, on "Reinforced Concrete;" F. E. Wynne, of the Westinghouse Electric and Manufacturing Company, "Some Applications of Electricity to Mining;" C. M. Burton, of the Dupont Powder Company, "Explosives;" M. E. Wadsworth, professor of mining and geology, State College of Pennsylvania, on "Some of Our Rocks and Common Minerals." The lectures will be delivered at various points embraced by the operations of the company.

The Delaware & Hudson Company has been experimenting with a gasolene locomotive for the purpose of determining the feasibility of that power for the passenger business between Scranton and Wilkes-Barre. The tests, it is said, were satisfactory. The company is anxious for a more frequent passenger service, as well as more rapid transportation between the two cities, owing to the competition of the third-rail system, which gives a 20-minute service.

W. L. Connell, of Scranton, has been appointed by the individual operators to represent them at the conference with the mine workers.

Commissioner Neill has notified the operators and miners that the latter are entitled to an increase of 5 per cent. above the basis for the month of January, being 1 per cent. less than the increase for the present month. The computation was made on a basis of $4.77 per ton, being the selling price of coal at tidewater. Mr. Neill has been re-appointed umpire by by Judge Gray, although he recently intimated to the Conciliation Board that he did not desire re-appointment.

Ketchikan, Alaska. Jan. 26.

The value of the first shipment of copper matte, consisting of 490 tons averaging nearly 50% copper, made recently to the Britannia Smelting Co.'s smelter at Crofton, Vancouver Island, B. C., from the Alaska Smelting and Refining Co.'s smelter at Hadley, Prince of Wales Island, was approximately $100,000. This matte was the product of about one month's run with a single blast furnace. The Hadley smelter's present sources of ore supply are the Brown-Alaska Co.'s Mamie mine, the Hadley Consolidated Co.'s Stevenson mine, the Cracker Jack mine—all three situated near Hadley—and the Ellamar mine on Prince William Sound. Beside these local ores silicious copper ore, for fluxing purposes, is obtained from the Britannia mine, at Howe Sound, British Columbia.

The Moira Copper Co., understood to have Milwaukee men as its principal shareholders, has made the final payment on the Ickis and Colvin group of seven mineral claims, adjoining the property of the Niblack Copper Co., on Prince of Wales Island. The purchase was arranged and a deposit paid several months ago, since which time the work done on the claims satisfied the buyers of their value and they completed the purchase. It is stated that development on a comparatively extensive scale will be entered upon next spring.

The Ketchikan Chamber of Commerce has decided to send to Boston, as its representative in advertising the resources of the district, Col. John Shoenbar, who will take with him an exhibit of ores from mines in the Ketchikan district.

Victoria, B. C. Feb. 6.

The Britannia Smelting Co., which on Jan. 4 commenced smelting operations at its works at Crofton, Vancouver Island, on Jan. 12 made its first shipment of blister copper—50 tons consigned to New Jersey. These works were erected in 1901-2 by Messrs. Jas. Breen and H. C. Bellinger, who organized the Northwestern Smelting and Refining Co. They were operated until the early part of 1904, when the available supply of ore became so small that they were closed down and remained idle until last Fall, when they were acquired by the Britannia Smelting Co. Since then plant and buildings have been put in good order and additions made under the direction of the general manager, Mr. Thos. Kiddie. The bulk of the ore being treated comes from the Britannia Copper Syndicate's Britannia mine at Howe Sound, distant 58 miles by water from the smelter. Small quantities have been received from the Mamie mine, Prince of Wales Island, Southeast Alaska; from Mullan, Idaho and other mines. Another shipment, of 400 tons, from Mamie mine, together with 400 tons of copper matte from the Alaska Smelting Co.'s smelter at Hadley, Prince of Wales Island, is due to arrive this week.

London. Feb. 3.

The South African mining market is not quite so confident with regard to the future of the Chinese labor question as it was when the new Liberal government made its pronouncement of its intentions. At the time it was generally felt that the pronouncement was made to satisfy the conscientious and religious section among non-conformists, and that the new government would be very slow to make any change in South African policy. Now that the Liberals have been returned to Parliament in such an overwhelming majority a good deal of uneasiness is felt in South African circles with regard to the future of South Africa, politically and socially. It appears that there is no constitutional way of cancelling the coolies' indentures and sending them back to their country forthwith, so that the ardent anti-slavery people will not be able to see their hopes realized. It is certain, however, that the new British government is able to prevent any further importation of coolie labor beyond those already contracted for, and to prevent those already engaged and at work renewing their indentures for a further term. As I remarked recently, the Liberal government, being committed to the policy of granting the Transvaal a responsible government at the earliest possible moment, will probably leave the colony to decide the labor question for itself. On the other hand, there is a strong party within the Liberal ranks which is opposed to giving the Transvaal or any other colony the complete control over affairs which are not of purely local interest. They argue that the coolie question is not a local one, as it brings the empire generally into relations with China and other foreign countries. If they get their way, it is probable that in any proposed new constitution of the Transvaal the coolie question will be treated as an imperial, and not as a local question. Another source of disquietude among South Africans is the presence of Boer leaders in London, who are getting at the private ear of those now in power, with a view of making such arrangements as will ensure the Boer population obtaining a majority in any proposed colonial assembly.

In addition to political uneasiness the South African market has been considerably upset by the very poor results obtained at various points on the eastern portion of the Rand, and especially at the Geduld, where the results are far poorer than was estimated. In fact, the discrepancy is so great that tampering with the original samples is freely discussed. This company is in the hands of Adolf. Goerz & Co., who are strong in Berlin, Paris and London, and it can hardly be supposed that the firm, or their chief officials, would go in for salting their clients. The situation is a serious one for them, and they are doing everything to find out the causes of the discrepancy, and have appointed independent mining men to make an inquiry. That there is something radically wrong in the sampling can be seen by the fact that in one case the original estimate was 16 dwt. over 54 in., while the results gave nothing but a trace. In another case 34 dwt. over 3 in. has been found to yield 8½ dwt. over 5 in. In a third case the original sample purported to give 92 dwt. over 6 in., and the result of working gave only 2¾ dwt. over 5 in. This certainly looks like salting. The South African mines have been free from this vice for many years now, and its apparent return is not calculated to do any good to the market.

Johannesburg. Jan. 1.

Politics play a most important part in Rand mining. People here were keenly sorry to see the withdrawal from power of the Balfour ministry and the entry of Campbell-Bannerman's. The announcement made by the new Premier that the further importation of Chinese coolies would be prohibited, has caused dismay

among the mining community. There is, of course, lots of ill feeling toward the Chinese, especially due to the outrages committed by the baser sort, and it is believed by some that were a referendum held on the subject, the majority would be in favor of the verdict of the Liberals. The choice is Chinese or the closing down of many struggling mines, which are beginning a prosperous career with coolie labor. The vote would undoubtedly be for Chinese, rather than bankruptcy. The distress on the Rand is keen enough as it is. Were any mines closed down, and the whites thrown out of employment, the situation would be most critical.

Most people here hope that the reign of the Liberal party will be brief. The British Colonies, especially the Transvaal, have cause to dislike the Liberal party. If the anti-Chinese agitation in England is carried too far, the people in this country will demand representative government, a doubtful blessing at this time.

The year 1905 has brought many ups and downs to the Rand, especially in market values of shares. Many stocks have fallen away to half or even a quarter of their prices a year ago. The market sensation of the year was the unjustifiable boom in South African Lands ("Sallies") and Associated Tin stocks, which excited and unthinking speculators, rushed up to enormous prices. The highest point reached by "Sallies" was £8 10s., while today one can buy them by the thousands at 23 to 24s. Other tin propositions which reached £5 are now unsalable at as many shillings. The tin boom unsettled the whole market, both the public and inside operators being left with the stock. No such wave of depresssion as the present one has passed over the country since 1899.

The record of Rand dividends for 1905 is a bright spot in a rather gloomy picture. The record of 1898, namely £4,848,238, will no doubt be reached. This will be a big increase over 1904, a gain of nearly £1,000,000. This large sum paid out to shareholders, should do a lot to restore confidence in the permanent value of the Rand.

Not long ago an important strike was made in a bore-hole in the Randfontein Deep, at the extreme west end of the Rand. Unlike other sections the strata do not flatten in depth, so that the bore-hole went down over 5000 ft. before finding the reef. These finds are added proofs of the millions of tons of payable ore in the deep levels, and the unparalleled future that the Rand has before it, as a gold producer.

The long depression in Witwatersrand stocks seems to continue. This country has its ups and downs; just now we are having the downs. The effect of the depression on the community is noticeable, and things seem far from bright. There is a lot of real distress. The number of cut-of-works in Johannesburg is great. Whether new arrivals or diminishing employment is responsible for the unfortunate condition of affairs, it is difficult to say. Many of the unemployed are not of the artisan class. One sees bookkeepers, shop assistants and former managers of large concerns, standing disconsolate at the street corners. Nor is the state of affairs at the coast towns any better. The development of the country progresses slowly, and this surplus labor cannot be immediately absorbed. This is no time for people to come to South Africa, and this fact ought to be impressed on those at a distance.

An interesting announcement is made by the Albu mines, under the technical control of Messrs. Denny. By the use of the filter press in the treatment of slime, the residues have been reduced to 0.12 dwt., or 12c. per ton. As the original value of the slime is not given, nor the cost per ton treated, no comparison with the old process can be made.

The treatment of accumulated slimes on the Rand has recently received quite an impetus. In the Klerksdorp district this accumulated slime is being treated at the Buffelsdorn mine, which has been idle for years. A monthly profit of about £1800 is being made. Costs were rather high at the start, but for the first quarter of this year they work out at about $1.45 per ton treated. At the Nigel mine, in the Heidelberg district, there are thousands of tons of high-grade slime being treated by the filter-press method. The cost per ton treated is rather high, but an excellent profit is being made.

On a leading mine of the Central Rand quite anoher method of dealing with accumulated slime is in use. The old slime is puddled and treated with the current slime by the decantation process. An extraction of over 80 per cent. is obtained from the 7-dwt. slime.

On most of the mines where there is a large tonnage of accumulated slime to treat they are adopting the method of puddling this material, and treating it with the current slime. By the filter-press method a better extraction is undoubtedly obtained, but with a 3-dwt. slime there is not much margin. In the future it is probable that no large plant will be built in the Transvaal without a slime plant.

Kota-Tinggi, Johore. Dec. 31.

Johore is an independent state under the rule of a Malay sultan. Although it is not possessed of the rich mineral resources of the Federated Malay States, yet by the security of its position in the close neighborhood of Singapore, and through its settled government, the country has attained some prominence as a tin producer among the native States, of the Malay Peninsula. The area of Johore is about 9000 square miles, with a population of a quarter of a million, principally Chinese. The population is confined to the districts near the coast and large rivers, the interior being covered by virgin forests, not yet explored.

Mount Ophir (over 4000 ft)., the highest peak in the State, is known to contain gold and tin, but as yet has not been scientifically explored, or systematically prospected. There is one lode gold mine in this neighborhood, but judging by share quotations it does not appear to make much headway.

Johore is rich in iron, which, however, is not worked owing to difficulties of transport and absence of coal. The country, under the energetic rule of the present Sultan Ibrahim, is rapidly being opened up with roads and railways, and there is not the slightest doubt that in the near future, when the interior is more easy of access, the mineral resources of the country will be properly developed.

Alluvial tin mining is carried on by Chinese in many parts of the State, but owing to primitive methods of working, the output is not large. The Royal Johore Tin Mining Co., Ltd., is the only European company in Johore, and during the past seven years it has met with fair success, turning out about 2000 tons tin oxide, giving on an average 74 per cent. pure tin. In many places the assay is as high as 76.5 per cent. The richest deposits are found at the foot of mountains, in the old silted-up beds of creeks. Top soil averages 20 ft. and wash dirt 2 ft. The latter frequently gives 4 to 8 lb. oxide to the cubic yard, which pays handsomely, even with the slow and out-of-date methods of mining. The mining on the company's property is all alluvial; up to the present no lodes have been located. The company clears the ground of forests, makes dams and drains and then lets the ground out on tribute to Chinese, who pay from 25 to 30 per cent. of their output; 8 per cent of this, however, going to the Govrnment. The company's profit is moderate but sure, as it makes no advance whatsoever to the tributors.

A paddock 200x900 ft. will be opened up by about 600 Chinese, in gangs of 50 to 60 men, and if they can get 1 lb. per man per day of dried oxide they are quite satisfied. They keep their workings dry by means of primitive water wheels (California pumps), washing the dirt in long toms. The company for some time ran two centrifugal pumps, but in the end found it cheaper to allow the Chinese to pump by their own methods. Top soil is carried away in baskets.

By dredging and hydraulicking, without a doubt big money could be made in Johore, but as already mentioned the State is not yet opened up, and until the roads and railways, now in course of construction, are completed, capital will fight shy of the place.

General Mining News.

Tennessee Coal, Iron and Railroad Company—At the special meeting held recently in Tracy City, Tenn., the stockholders adopted a resolution to increase the capital stock to $30,000,000 by the issuance of new common stock and to authorize the disposition of the new stock. The action of the directors in increasing the stock was ratified. The directors of the company met in New York later, and elected George A. Kessler a member of the board. S. L. Schoonmaker and F. S. Witherbee resigned from the directorate, and no action was taken regarding the filling of the vacancies, of which there are now three. It was decided to issue a circular to stockholders offering them the right to subscribe at par to the extent of 15 per cent. of their holdings for $3,417,204 of new stock out of a total authorized issue of $6,751,700 new stock. The balance will be issued as the company requires. The payment on the subscriptions will be 25 per cent. at the time of subscription, 25 per cent. July 16, 25 per cent. Oct. 16 and the final 25 per cent. Jan. 16, 1907. The subscription books will be opened probably some time this month. The expenditure of several millions on the property of the company is expected to enhance its earning capacity. At present it is producing about 50,000 tons of pig iron a month and is turning nearly 50 per cent. of it into finished products. It is estimated that the new capital, together with the accumulating surplus earnings, will enable the company to increase its pig-iron production in time to 1,000,000 tons per annum, and it is contemplated to turn all of this output into finished forms.

ARIZONA.

GILA COUNTY.

Warrior—This mine near Globe, formerly the Black Warrior, is now shipping 60 tons of ore daily to the Old Dominion smelter at Globe. E. M. White is superintendent.

GRAHAM COUNTY.

Arizona Copper Company Ltd.—The directors had before them at their recent meeting in Glasgow the results for the year to Sept. 30, 1905, subject to final audit. After carrying to reserve a sum of £50,000 for redemption of dept, replacement of capital outlay, etc., the surplus, including £10,286, brought forward from 1904, is £321,385. After deducting the preferential dividends, amounting to £24,531, a sum of £296,854 is left. The directors have resolved to recommend to the annual meeting to be held on Feb. 19, the payment out of this sum of a dividend for the year to Sept. 30, 1905, of 3s. 9d. per share, free of tax, on the preferred ordinary and deferred ordinary shares. To account of this dividend 1s. 6d. per share was paid on July 27 last, and it is proposed that the balance of 2s. 3d. per share be paid on Feb. 21. The dividend for the year of 3s. 9d. per share absorbs £284,980, and the balance of £11,874 will be carried forward.

CALIFORNIA.

AMADOR COUNTY.

Kennedy Mining and Milling Co.—This company in Jackson in working the tailings from the 100-stamp mill obtains about one ton of sulphurets per day, worth $50 per ton. There are 64 tables over which the tailings pass, the fine sulphurets being caught on the canvas. The tables are cleaned hourly, and the sulphurets saved are again run over concentrators to be cleaned. These sulphurets are of less value than those caught in the mill.

South Eureka Mining Co.—Geo. E. Dow, the pump manufacturer of San Francisco, is installing at this mine, Sutter creek, a pump to lift the water 1800 feet vertically at the rate of 100,000 gallons daily.

CALAVERAS COUNTY.

Napoleon—This copper property has been sold by the Williams Bros. to Los Angeles men, and a force of men has been set at work after a year's idleness of the mine. The ore will be hauled by traction engine to railroad.

Benson—At this mine they have installed a 75 h. p. electric motor to work the compressor, and the machinery being operated by compressed air. Rich ore has recently been uncovered.

EL DORADO COUNTY.

Idaho—This mine, owned by Reese & Roelke, between Kelsey and Spanish Flat, has been bonded by A. Ball and W. P. Frick, who are moving a quartz mill to the property. The ledge has been developed by tunnels.

Big Canyon—This mine, near Shingle springs, has been bonded, and is about to be unwatered. The mine has been idle for the past seven years.

Eagle Bar—This mine, A. C. Rumble, superintendent, will shortly start up as soon as the river current carries the accumulated debris into the company's dam.

FRESNO COUNTY.

Coalinga Oil—The monthly production of the Coalinga field is 867,000 barrels of petroleum. There are 228 producing wells with an average production of 135 bbl. daily. Twenty more new wells are being drilled.

KERN COUNTY.

Tungsten—The De Goli Atkin Company, which recently bought the McCarthy-Taylor properties, has shipped 25 tons of tungsten ore to Germany via New York. This shipment is of a higher grade than the previous one.

NEVADA COUNTY.

Cold Spring—This gravel mine on the Washington Ridge has been purchased by New York men. The 300 acres include three-quarters of a mile along the gravel channel, which is about 200 ft. wide. The mine was worked to some profit 30 years ago.

Central Consolidated Mining Co.—The 20-stamp mill of this property has started up. It was purchased from the Coe company, and electricity is used for power. Stoping is in progress on the Greenhorn, Duval and Central Iedges.

Maryland Mining Co.—The 800 level of this mine at Grass Valley has been cleared of water, and the station is being put in good shape. When the 1000 level is reached, sinking the new shaft will be commenced. The mill is being operated on ore from the upper levels.

Ironclad—At this mine, Rough & Ready, the water in the shaft is being rapidly lowered, and a larger force of men will shortly be employed

Mount Jefferson.—The Nevada county mine of this company at Nevada City, has been attached by miners to recover wages due. The entire sum is about $700.

PLACER COUNTY.

Ophir Valley Group—The group, consisting of the Buttes, Eureka, Hathaway and Kirkland claims, has been bonded by D. C. Monroe, of New York, and electricity will be installed for power. There is a 20-stamp mill on the property.

Baltimore—At this mine, Forest Hill, 50 miners are at work, and dividends are being paid.

Dardanelles—Extensive improvements have lately been made at this mine, Forest Hill, and a large force of men will shortly be employed.

Jarvis—Superintendent Geo. McAuley is doubling his force of men on this mine to take advantage of the plentiful supply of water for washing gravel.

Paragon—This old mine at Bath (formerly the Breece & Wheeler) has had its pit flooded by excess of water, there being 20 feet of it to be pumped out.

RIVERSIDE COUNTY.

Cahuila Mining Co.—This Boston company, with J. H. Whitlock as manager, has started mining in the old bed of the San Jacinto river between Perris and Elsinore. A gasolene engine and pump are employed to pump out the water holes, and the gravel will be sluiced.

SISKIYOU COUNTY.

Yreka Creek Dredging Co.—This company is using drills to prospect the ground in Yreka basin, between Yreka and the mouth of the creek at Shasta river, below Hawkinsville.

Ball Group—At this mine, near Sawyers, E. W. Raymond superintendent, 20 men are employed, and the force is to be increased. Crosscut tunnels are being run to connect the Stephens and Ball groups.

Medina Mining Co.—This company has resumed work again after a

short close-down, and the mill is crushing ore from the Gardner mine. They have struck the ledge in both the north and south drifts at the bottom of the shaft, and it prospects well.

TUOLUMNE COUNTY.

Soulsby Mining Co.—At this property, Soulsbyville, the Davidson and Pennsylvania shafts, 800 ft. apart, are being unwatered, and will be connected by a drift. The Pennsylvania shaft is to be deepened 300 ft., and the necessary pumps have been ordered.

COLORADO.

LAKE COUNTY.

Iron Silver Mining Company—This company at Leadville recently completed the purchase of a Reynolds heavy duty air compressor, capacity 1000 cu.ft. of free air per minute to 100 lb. pressure, and a 17x18-in. steam-driven Reynolds individual jet condenser, with a capacity of 5000 lb. of steam per hour. The new equipment will be furnished by the Allis-Chalmers Company, Milwaukee, and is for the company's new Moyer shaft, where it will be put in place under the direction of the superintendent, Mr. O'Brien, early in May.

SAN JUAN COUNTY.

The smelting works at Silverton have recently been sold by the Kendrick Promotion Company to Pittsburg parties, who are represented by Ross Brothers, of Silverton. The sale has been made to the Ross people under an option, on which they have made their first payment, and have commenced making changes at the smelter, but have been delayed on account of the severe winter weather at Silverton; otherwise the smelter would now be running. It is their intention to double the capacity of the smelter and do probably $100,000 or $200,000 worth of improvements within the next few months. They have made large coke contracts for continuous running and are prepared to buy a coal property and put in their own coke ovens if there should be any hitch or delay in securing coke at satisfactory prices. They buy the smelter to handle largely their own ores, as they have already invested much money in the Silverton district. One of their most important purchases was that of the Champion Group, another the Galty Boy Group and the group adjoining the Sunnyside; and they have under contemplation the purchase of one of the largest producing properties in the San Juan district.

With regard to increased activity in the San Juan district the San Juan Smelting & Refining Company is working its No. 10 tunnel. On the Henrietta vein it has blocked out 350,000 tons. The smelting ore runs close to $25 a ton and the milling ore about $10 a ton. There are about nine tons of milling ore to one ton of smelting ore.

The Kendrick Promotion Company has put over a half million dollars into the properties it controls in the San Juan section, the bulk of it going into the building of the smelter and the improvement of the connected properties.

GEORGIA.

LUMPKIN COUNTY.

Georgia Mining and Development Co.—This company has been incorporated with $1,500,000 capital stock to work gold mines near Dahlonega. The incorporators are S. W. Van Syckel, Wm. R. Word, T. Halsted Smith, W. E. Scott and associates.

ILLINOIS.

Dering Coal Company—Recently negotiations were completed for the merging of four large coal operating companies under one management, although each of these companies will continue a separate existence as an operating company. The product of the 34 mines which are embraced in the consolidation, however, will be sold by one company, the Dering Coal Company, of Chicago. The control of the Dering Coal Company has passed from the original owners of a majority of the stock, Robert R. Hammond and J. K. Dering, to capitalists who are closely identified with the Rock Island-Frisco group of railroads. The companies which will be controlled in this way are the Dering Coal Company, of Chicago, owning 15 mines in Indiana and Illinois, and operating four mines under lease or partly owned by officials of the company, incorporated as the Burnwell Coal Company; the Indiana Consolidated Coal Company, incorporated in the latter part of last spring, a merger of nine mines in Indiana, and the Brazil Block Coal Company, operating six mines in the Block district of Indiana. This makes a total of 34 mines, a number of which are yet in their infancy so far as the development of a maximum tonnage is concerned.

The present normal capacity of these 34 mines is 30,000 tons daily. On the basis of 200 working days to the year they will produce 6,000,000 tons of coal annually. With further development, however, it is believed that the annual production can be easily increased to 10,000,000 tons when it is required by market conditions.

KANSAS.

MARSHALL COUNTY.

Blue Rapids Gypsum Company—This company, at Blue Rapids, recently purchased 122 tons of transmission machinery, a 12 and 24x36-in. Reynolds Corliss heavy duty cross-compound engine and a Gates rock breaker. The new outfit, furnished by the Allis-Chalmers Company, Milwaukee, will be used for the preparation of commercial plaster for the market.

KENTUCKY.

KNOX COUNTY.

Lynn Camp Coal Co.—This company has leased a tract of 800 acres of coal near Gray, and is making arangements to open up a coal mine. L. H. Hedrick is president; W. B. Craven, vice-president; S. F. Rock, secretary-treasurer and general manager.

MICHIGAN.

HOUGHTON COUNTY—COPPER.

On Thursday, Feb. 8, an earthquake or "air blast" was felt in Houghton and Hancock which closed two shafts in the Quincy mine, the miners being obliged to leave by other openings. No damage to buildings in the towns was reported. This disturbance was similar to the shock experienced last summer, when many buildings in Calumet and Lake Linden were damaged. Opinion is divided as to the nature of these phenomena.

MINNESOTA.

CARLTON COUNTY.

In the drilling for coal that is under way in Carlton county, about 30 miles south of Duluth, one drill has bored a depth of 240 ft. and the operations are maintained. The parties in charge of the work are adding to their options on land in the vicinity, which is taken to mean that results are favorable. Really nothing has yet been found but a graphitic slate, rather badly mixed. While certain current rumors, to the effect that these drillers were looking for iron ore, may have some basis in fact, they give no assurance that the indications for anything are especially strong.

MISSOURI.

MADISON COUNTY.

North American Lead Company—This company, at Fredericktown, in making additions to its present plant, recently purchased five No. 3 Overstrom concentrating tables—two right and three left hand—fitted with copper riffles. These tables were built by the Allis-Chalmers Company, Milwaukee. In addition to the new concentrating machinery the North American Company has also added to its electrical eqipment in the purchase of a 150 kw. Bullock type H direct-current generator with small motors, types H and B, aggregating 100 h.p. The electrical apparatus will also be furnished by the Bullock works of the Allis-Chalmers Company at Cincinnati.

HENRY COUNTY.

Bowen Coal Co.—This company has been organized to succeed the firm of Bowen Brothers. They have been operating three coal mines with a daily capacity of 700 tons. It is proposed to arrange at once for the opening of additional mines. R. Bowen is president; John Bowen, vice-vice-president and secretary; W. S. Bowen, superintendent of mines.

PIKE COUNTY.

Henry Clay Coal and Coke Co.—This company has been incorporated to mine coal and make coke. It has secured property near Lookout. The incorporators are West Virginia and Pennsylvania people, the leading ones being W. J. Beury, of Algoma, W. Va., and C. W. Adams, of Pottsville, Pa. Work is to begin soon.

MONTANA.

PARK COUNTY.

Montana Coal and Coke Company—J. A. Coram, acting in behalf of the American Consolidated Copper Company, has made a formal proposition to the stockholders of the Montana Coal & Coke Company, in which he offers to give one share of the new for each eight shares of the Montana stock, provided a majority of the shares can be acquired for exchange on or before Feb. 17. President White of the Montana company, in a letter addressed to the shareholders, notes the fact that upward of 70,000 shares of stock, including the holdings of the directors and some of the large stockholders, have already been deposited with the Federal Trust Company, Boston, in response to this offer.

SILVER BOW COUNTY.

In New York, Feb. 13, a statement was given out of the final settlement of the Butte copper litigation. According to this statement papers were filed in Butte Feb. 13, transferring to Thomas F. Cole, who will hold the same in trust for a new company, title to all the disputed mining ground of the United Copper Company or F. Augustus Heinze, including the Minnie Healy, the Michael Davitt, the Nipper group of mines, the undivided interests in the Tramway and Snohomish mines and also the Montana Ore Purchasing Company smelter. It is understood that the United Copper Company receives for these about $25,000,000, fully one-half cash and balance in securities. While the United Copper Company disposes of all its law suits, litigated ground and smelter, it retains the Lexington group and some claims not now developed, and has a favorable contract for the treatment of its ores at the new Washoe or Amalgamated smelter. Mr. Cole and his associates, including North Butte, Amalgamated, Heinze and Guggenheim interests, furnish the money for the purchase of the property in dispute, and will organize a new company on a cash basis with at least $5,000,000 cash in the treasury and agreements with the Amalgamated companies under which the litigated territory will be immediately developed.

The amount of capital for the new corporation will depend upon the final determination of the operating relations in connection with the Amalgamated companies. In some cases a vertical line of ownership will be drawn; in others, joint ownership may be continued; and in still others, purchases from the Amalgamated companies may be made. But everything will be on a cash basis, and details of settlement will be entirely with Mr. Cole and Presidnnt John D. Ryan, of the Anaconda Company. Mr. Cole is now in possession of all the properties in litigation or in dispute, including everything that has at any time been in dispute between Mr. Heinze the Amalgamated interests. The new corporation will start with a production from the Heinze properties, of about 35,000,000 lb. of copper per annum. This can be increased from the disputed ground in time, as smelting arrangements are increased and property opened. Mr. Heinze and the United Copper Company remain as operating factors in Butte, developing the Lexington group and other property which is not included in the sale.

It is hinted that this settlement is a preliminary to some large plans of consolidation, to be brought ont in the future.

NORTH CAROLINA.

CATAWBA COUNTY.

Graphite deposits near Newton are to be developed by the Southern Engineering Company. The intention is to build a manufacturing plant also. E. A. Gammage, of Chicago, is president of the company.

OREGON.

BAKER COUNTY.

Indiana—Manager J. W. Messner, of the Indiana mine in the Medical Springs district, 20 miles east of Baker City, reports they now have over 1200 ft. of development work done on the 300-ft. level during the past three months, in the way of tunnels, cross-cuts, drifts and upraises. The total amount of development work is about 2000 ft. The hoisting and sinking plant has a capacity of a depth of 1000 ft. An electric light plant already on the ground will soon be installed.

Blue Bird—This mine, in the Red Boy district, 30 miles west of Baker City, is under the management of O. C. Wright, who reports that in the cross-cut tunnel they have just opened five different veins of pay ore at 800 ft. depth.

Ophir & Sheridan—Wheeler & Co., of New York, operating the Ophir & Sheridan group in the Cable Cove camp, 30 miles west of Baker City report to Manager Tom. C. Grey that they have decided to put in a hydro-electric power plant on Baldy Lake, which will furnish them light and power, and give sufficient power to spare for neighboring mines.

PENNSYLVANIA.

BITUMINOUS COAL.

Struthers Coal and Coke Company—This company, which is a branch of the Struthers Furnace Company, Struthers, Ohio, has put in operation 20 coke ovens at its plant in the Klondike region. It expects to build 140 more ovens, work on which will start in a short time.

TENNESSEE.

MAURY COUNTY.

Arrangements are being made to develop the phosphate deposits on the 500 acres of land owned by the Hughes estate. The property is eight miles from the railroad; C. W. Gifford, of Nashville, Tenn., has charge.

UTAH.

BEAVER COUNTY.

Newhouse Mines and Smelters—A steam shovel has arrived at the Cactus copper mine. The mill is treating about 700 tons a day.

Majestic—Developments at the Harrington-Hickory lead property continue to be of a very encouraging nature.

JUAB COUNTY.

Lower Mammoth—Conditions at this property are encouraging. The company is a little more than paying expenses out of shipments of low-grade ore from the south cross-cut of the 1500-level, but is not making much headway toward paying off the $10,000 indebtedness. There is some talk of an assessment to wipe this out. Developments in the east cross-cut indicate the near approach to ore. The management expects to encounter a high-grade body there.

Uncle Sam Consolidated—Physical conditions in this property have never been better. The mill is running steadily.

Carisa—Shipments of from four to six cars per week are being made from this property.

Yankee Consolidated Mill—It is expected the construction of this plant will commence before April 1. It is to be built under the direction of F. W. Sherman, superintendent of the Daly West mill at Park City. The initial unit will handle 100 tons per day.

Grand Central—This company is going to sink a winze to a depth of 300 to 400 ft. from the present lowest level and in the most productive portion of the mine.

May Day—Some favorable developments have been made on the 500-level of this property.

PIUTE COUNTY.

Sevier Consolidated—It is expected that the new mill and power plant will go into commission in about ten days.

Annie Laurie—The mill at this property is undergoing repairs, while the mine force is about as large as usual.

SALT LAKE COUNTY.

Consolidated Jefferson—At a distance into the mountain of 700 ft. a 6-ft vein of gold and copper ore has been opened by tunnel. The property is located about 15 miles from Salt Lake City, near the mouth of Little Cottonwood cañon

South Columbus—The surface improvements of this property at Alta were swept away by a snowslide recently.

City Rocks—Snowslides and severe storms in the vicinity of Alta have interfered with work on this property. The storms came before the winter's supplies were taken in.

New England Gold and Copper—Some important developments have been made in this Bingham property. An orebody has been opened in a raise to the Hepburn level from the Nast tunnel.

Butler Liberal—This property, in Markham Gulch, Bingham, is under new management and development work is being pushed.

SUMMIT COUNTY.

Wabash—This company is preparing to double its mine force. A special meeting of shareholders has been called for Feb. 22, at which the matter of increasing the capital stock from 300,000 to 400,000 shares and making the par value of the same $5 instead of $1 will be considered. It is proposed to make the new issue and the 50,000 now in the treasury non-assessable.

West Quincy—Operations in this property have been suspended, the contract which permitted the company to develop its ground through the Little Bell shaft having expired. The management is making an effort to make similar arrangement with the Daly Judge company, in which event a cross-cut of 900 ft. will have to be run.

Little Bell—Severe snowstorms have interfered with the completion of the ore bins and inauguration of ore shipments.

TOOELE COUNTY.

New Stockton—This company has completed the installation of a new hoisting plant and sinking of the shaft from the 800 to the 1000-ft. level. The mill has resumed operations and is working on about 40 tons a day.

Honerine—One of the largest bodies of high-grade silver-lead ever opened in this mine has been encountered in the drain tunnel. The sinking of the main shaft 50 ft. further will make connection between the shaft and tunnel. When this is done the company will begin production again.

WASHINGTON.

FERRY COUNTY.

Steiner Group.—This consists of 9 claims, situated on the south half of the Colville reservation, on a large gold copper bearing vein of iron sulphide, with a quartz gangue. A shaft has been sunk 100 ft. on the vein under contract. The vein will be crosscut.

Mountain Lion Gold Mining Co.—A special meeting was held at Portland, Oregon, Jan. 23, to consider the future of the mine and company, to discuss the experiments that have recently been made on the treatment of the Mountain Lion ore and the purchase of special machinery. There is an indebtedness of $85,000 held by Montreal and Toronto people against the mine and mill, which will also be discussed. C. S. Verrill, who has had charge of the experimental tests, has gone to Portland to attend the meeting. The mine has been unwatered down to the 600-ft. level, where the vein was crosscut and work suspended. Work has been resumed on that level, drifting on the vein. The ore makes more concentrates on this than on that from the upper levels, and the proportion of silver to that of gold is only about 1 oz. to 1, all against 5 or 6 oz. to 1 on the upper levels.

Oversight.— The new power plant is operating successfully. The drift along the footwall will be carried in 100 ft., when another crosscut will be driven on the vein.

Keller & Indiana Consolidated Smelting Company—This company has nearly completed the construction of a smelting plant of 150 tons daily capacity at Keller. It has an iron and a lead-smelting furnace. Keller is 50 miles south of Republic, and is 24 miles from the nearest railroad shipping point. The work is under charge of R. L. Boyle as manager. It is said that the company has absorbed the Silver Creek and the Byrne mining companies. The Silver Creek company owns several claims, on which some work has been done with good prospects. The Byrne company also owns a group of claims in the Keller district.

OKANOGAN COUNTY.

Ruby.—This lies on Mount Chapaca, close to the Similkameen river. The north drift, on the lower tunnel level, has run into a pay shoot, 2 ft. wide, that assays high. There is another Ruby mine in this county.

STEVENS COUNTY.

First Thought.—Mr. Sharp is superintendent, his address being Orient, Ferry county, Wash. This mine is shipping 40 tons of ore a day and claims to have produced more gold in 1905 than any other mine in the State of Washington.

Napoleon.—This adjoins the First Thought and is shipping 30 tons of gold-bearing ore a day to the B. C. Copper Co.'s smelters, at Greenwood, B. C.

SPOKANE COUNTY.

International Smelting Co.—This company has been organized, with $10,000,000 capital stock, to build smelting works at Spokane. The incorporators are believed to be temporary only. F. W. Dewart, of Spokane, is in charge of the project.

WEST VIRGINIA.

MERCER COUNTY.

Consolidated Fuel Co.—At a recent meeting of this company at Bluefield, William E. Fowler was elected president; H. Archer Mitchell, secretary-treasurer; S. S. Cofer, general manager.

Foreign Mining News.

CANADA.

BRITISH COLUMBIA.

Granby Consolidated Mining, Smelting and Power Co.—This company at Granby, in the Boundary district, has recently added another converter stand, complete with hydraulic cylinder for operating the same, to those already installed. The new equipment was purchased from the Allis-Chalmers Co., Milwaukee.

ONTARIO.

Atikokan Iron Co Ltd.—At the annual meeting at Port Arthur, Ont., directors were elected as follows: William Mac Kenzie, president of the Canadian Northern Railway; D. D. Mann and Z. A. Lash, vice president and counsel of the same road; Hugh Sutherland, Winnipeg; A. Stafford White, Chicago; J. W. deC. O'Grady, Winnepeg; R. M. Hunter, Duluth; J. C. Hunter of Port Arthur. Wm. MacKenzie was chosen president; J. C. Hunter, vice-president and general manager; Hugh Sutherland, secretary and R. M. Hunter, treasurer. Messrs. Sutherland, Lash and J. C. Hunter made up the executive board. The company has completed the foundations for its blast furnace, stoves, boilers, cooking ovens, roasting plant, engine house and trackage approaching the works. Contracts have been let for the superstructure with the idea of being ready to blow in by Aug. 1 next. Its mines on the Atikokan range are equipped, a branch line from the Canadian Northern is under construction, and the company expects to be able to handle from 600 to 700 tons of ore per day by May next.

YUKON TERRITORY.

Canadian Forty-Mile Gold Dredging Co.—Allis-Chalmers-Bullock, Ltd., Montreal, the Canadian representatives of the Allis-Chalmers Co., Milwaukee, recently received an order from the Canadian Forty-Mile Gold Dredging Co., the headquarters of which are at Toronto, Canada, for a special gold dredge equipped complete with 5⅓-cu.ft. buckets. The contract covers the entire machinery equipment complete, ready for operation, including electric-light plant, two boilers, 100 h.p. each, engines, pumps, etc. The dredge will be ready for use early in May.

MEXICO.

MEXICO.

The new 100-stamp mill of El Oro Mining & Railway Co., Ltd., at El Oro, Mexico, is now handling the entire output of 15,000 tons per month, and the old mill has been put out of commission. The new mill is equipped with the Blaisdell system of automatic handling.

SONORA.

Guadalupe.—This mine, in the Bacoachi district, not far from the Picacho mine belonging to the Phelps-Dodge Co., is showing signs of greatly increased activity. There are now more than 1,000 ft. of tunnels, shafts, drifts and crosscuts opened. The lower tunnel is in about 350 ft., while the upper tunnel has been driven to crosscut the vein whence a drift connects it with shaft No. 1 at the 200-ft. level. Crosscuts in the tunnels and shafts, with exploratory holes at several points and a surface crosscut on the outcrop complete the present workings. The upper workings are in blue and yellow quartz, and samples taken from across the entire vein give values of $14 gold, and from 12 to 22 oz. silver per ton. In the red quartz, gold values run from $6 to $9 per ton.

Santa Bana—This mine at La Bufa has been sold by Uneko Ten Oever to parties from Leadville, Colo. The purchasers are to begin work at once and to spend $10,000 before the final transfer is made; the deed meantime being in escrow with the Bank of Sonora at Hermosillo. The mine is in the Sahuaripa district and has abundant supplies of water and wood. The vein exposed is from 3 ft. to 7 ft. wide and runs high in silver and copper, with some gold. It is an old Spanish mine and has quite a history. The present workings consist of narrow tunnels, about 250 ft. long.

TEPIC.

Cucharas Mining Co.—This company controlled by the Lacy Manufacturing Company, of Los Angeles, owns mines at Acaponita. J. M. Nissen, of the Nissen Engineering Company, of Los Angeles, Cal., is now erecting four Nissen stamps, and five concentrating tables at the mine.

ASIA.

INDIA.

Important discoveries of manganese ore have been made in Southern Canara, on the Southern Mahratta Railway.

Experts declare that the placer gold workings in the Dharwar district, which have lately been attracting considerable attention, extend to the coast, and undoubtedly exist below the Ghats in Portuguese India.

BURMA.

The report of the Burma Ruby Mines Co., dealing with the mining operations carried out during 1905 states that a larger tonnage of earth was treated, but the value of the rubies obtained was about $13,000 less than the previous year.

Gold mining in Burma is chiefly confined to river dredging, as the Kyaukpazat mines which yielded 1396 oz. of gold in 1903 were closed down in the following year, and have since been abandoned. The mining authorities are preparing regulations suitable for the gold dredging industry which promises to expand within the next few years.

There was a good demand for jade last year and the Burma jade mines yielded 100% more high-grade jade than in 1904. The output was valued at $45,026. The principal market for this mineral is in China. Burma exported $24,000 worth of jade to Chinese ports last year.

NEW CALEDONIA.

Exports from New Caledonia for December and the year are reported by the *Bulletin du Commerce,* of Noumea, as follows, in metric tons:

	December.	Year.
Nickel ore	8,949	125,289
Cobalt ore	139	7,920
Chrome ore	2,472	51,374

Stocks of chrome ore ready for shipment on Dec. 31 amounted to 940 tons.

Coal Trade Review.

NEW YORK, Feb. 14.

ANTHRACITE.

The hard-coal market showed a little burst of activity at the end of last week when this city had a short spell of winter weather; it has now regained its former quietness. The activity of the local market appears also to respond quickly to the appearance of reports for or against the probability of a strike. At present all coal except the steam sizes is in supply greatly exceeding the demand; the steam sizes move off regularly at well-sustained prices. The threatened strike of the local coal teamsters came to nothing.

Prices remain as follows: $4.75 for broken and $5 for domestic sizes. Steam sizes: $3 for pea; $2.25@$2.50 for buckwheat; $1.45@$1.50 for rice and $1.30@$1.35 for barley f.o.b. New York harbor shipping points.

BITUMINOUS.

The soft-coal trade along the Atlantic seaboard shows an increased inquiry, due principally to strike talk and the short spell of cold weather. This has not raised the prices of ordinary steam grades, although some of the specialties are now getting 10 or 20c. more than they did; the ordinary grades sell at $2.50@$2.60 f.o.b. New York harbor shipping ports.

The likelihood of a strike is not yet determinable; in general, the times are not propitious for the success of a strike, since large stocks of coal are known to have been accumulated. It is thought that most of the large consumers not only have their full stocks almost intact, but in many instances they have reserves to fall back upon. The small consumers, however, whose storage capacities do not hold the same ratio to their consumption, are not so well prepared to withstand a stoppage, and they will accordingly feel the bad effects more.

During the last week the railroads have had some difficulties in the way of transportation, and in some cases coal has required eight or ten days to come through to tide, or nearly double its customary time. Shippers are complaining also of shortage of cars, stating their supply to be about half or three-quarters of their requirements.

The far East shows a disposition to take on extra cargoes wherever a consumer has storage room; in other cases extra cargoes are taken to replace the depletion of the winter. Stocks are generally reported to be of fair size. The Sound is in much the same condition, its large stocks not having been heavily drawn upon; wherever depletion has occurred fresh stocks are promptly secured. New York harbor is scarcely able to absorb the coal arriving there, and prices are weak at the above quoted figures. All-rail trade is active and the demand is strong at well-sustained prices.

Vessels in the coastwise market are in good supply. Current rates from Philadelphia are quoted as follows: To Boston, Salem and Portland, 80c.; to Lynn, 90c.; to Portsmouth, 80@85c.; to the Sound, 65@70 cents.

COAL TRAFFIC NOTES.

The total coal and coke traffic orginating on all lines of the Pennsylvania Railroad east of Pittsburg and Erie for the year to Feb. 3 was as follows, in short tons:

	1904.	1905.	Changes.
Anthracite	371,476	498,961	I. 127,485
Bituminous	2,485,157	3,422,533	I. 937,376
Coke	939,431	1,196,469	I. 257,038
Total	3,796,064	5,117,963	I. 1,321,899

The larger increase this year has been in bituminous coal.

The shipments from the Broad Top region in Pennsylvania for the week ending Feb. 10 were 21,575 tons; for the year to Feb. 10 they were 119,970 tons.

Coal shipments over the Southern railway in November were 267,362 tons. For the 11 months ending Nov. 30 the total was: Tennessee district, 1,432,002 tons; Alabama district, 1,516,300 tons; Alabama coal to Mississippi river trade, 112,824 tons; total, 3,061,126 tons.

Birmingham. Feb. 12.

The official figures of the State Mine Inspector, J. M. Gray, with a few corrections still to be made, put the coal output for 1905 at 11,731,562 tons. The production in 1904 amounted to 11,273,151 tons. The larger corporations in this State make the following showing as to output during the past year: Tennessee, 2,098,160 tons; Pratt Consolidated, 1,504,085; Sloss-Sheffield, 1,073,761; Republic Iron and Steel, 656,368; Alabama Consolidated, 634,543; Galloway Coal, 580,485; Corona Coal & Iron, 433,834; Bessemer Land and Improvement, 303,659; Tutweiler & Short Creek, 139,188; Lacey-Buek Iron, 207,900; Southern Steel (Alabama Steel & Wire), 220,240 tons. Thirteen counties in Alabama produced coal last year, Jefferson county producing the largest amount, 5,550,000 tons. Bibb county produced

1,381,675 and Walker county 2,708,145 tons.

The coke report for the past year, with two or three smaller places to be heard from yet, shows a production of 2,209,972 tons, against 2,284,095 tons in 1904. Several hundred coke ovens will be constructed in Alabama this year, the Southern Steel Company, the Alabama Consolidated Coal and Iron Company and the Sayre Mining Company having let contracts already.

Cleveland. Feb. 13.

Coal prices have strengthened somewhat in this territory during the week. Weather was one cause, but the possibility of a strike was a more potent one. The objection to an advance in the wages of the miners is based on competitive conditions recently appearing, and indicates that the operators will submit to a prolonged strike rather than pay the advance. Kentucky producers have been doing a good deal of business in the Northwest. They operate with non-union labor, have a better grade of coal and lower freight rates. Any advance in the mining charge to West Virginia and Pennsylvania would immediately put the Kentucky producers in the market of the Central West with equal conditions. Their grade of coal would give them an advantage. This is the backbone of the objection to the advance to miners at present. Mine workers not caring to give the operators a chance to pile up a surplus against a strike, are finding numerous occasions for laying off and mine operations have been on a reduced scale. In addition the cold weather of the past week has brought an increased demand, while delays to railroad equipment have lessened the supply in this market. Run-of-mine steam coal is stronger at 95c.@$1 at the mines, while slack is selling at 75@80c. at the mines for Ohio and 60@65c., Pittsburg, for Pennsylvania. Coke is likewise stronger, with a good demand and a shorter supply. The best grades of 72-hour foundry coke are strong at $3@$3.25 at the oven, while furnace coke is selling at $2.35 to $2.50 at the oven.

Chicago. Feb. 12.

Owing to cold weather and the reports of a probable general strike April 1, the local market for coal is better than it has been at any time previously this winter. This week's sales of both anthracite and bituminous have been heavy, there being a rush of consumers and retailers to lay in stocks. Railroads also have been large buyers. The result of this condition has been a general advance in prices of bituminous coal, with the prospects that the sales of the week now opening will be the largest this season.

Bituminous is 10@35c. higher than before the result of the Indianapolis convention became known, all grades being affected. Indiana and Illinois bring $2.25 @$2.65 for lump, $1.75@$2.15 for run-of-mine and $1.30@$1.65 for screenings. Steam coals are most in demand, domestic grades showing the least change.

Eastern coals are in good demand now at higher prices, and with no surplus on tracks to force down values. Smokeless run-of-mine is especially in demand, bringing $3.15@$3.30, with lump and egg 40@75c. higher and not so active. Hocking is in very good demand, at $3@$3.50, with the increased demand chiefly for the lower-priced kinds.

The increased demand for anthracite is especially heavy and wholesalers infer that there will be a general laying-in of stocks by householders for next year. Much of the demand, however, is due to the first real cold weather over Chicago territory. Retailers' supplies have been notably low, causing large demands with each drop in the temperature.

Pittsburg. Feb. 13.

Coal—The mines are running fairly well but a car shortage has developed and may result in a slight curtailment of production this week. Prices remain about the same, mine-run coal being quoted at $1@$1.10 a ton at the time. The district convention of miners, which continued in session all week, adjourning on Saturday to meet again tomorrow, was the most exciting ever held. The efforts to depose President Patrick Dolan were fruitless, as he went into court and obtained a temporary injunction against 139 of the delegates, enjoining them from removing him from office or interfering in any way with his rulings in the convention. The bitterest feeling exists and it is believed the demoralization of the miners in this district may prevent the carrying out of the plans for a general suspension on March 31 if an advance of 12½ per cent. is not granted the miners in the bituminous fields. Dolan has issued a statement denouncing the demand for an advance and explaining why he voted with the operators at the joint conference, for continuing the present mining rate for another year. A conference between President John Mitchell and officers of the anthracite miners, and the representatives of the anthracite operators is scheduled to be held in New York on Thursday. According to Dolan a settlement cannot be reached under the decision of the convention until an agreement is entered into for all districts.

Connellsville Coke—Furnace coke is now quoted as low as $2.20 and foundry at $2.75. The furnaces are well stocked with fuel and there was a slight falling off in production and shipments. The production for the week was 282,233 tons, or 1136 tons less than the previous week. The shipments aggregated 11,750 cars distributed as follows: To Pittsburg and river points, 4257 cars; to points west of Pittsburg, 6267 cars; to points east of Everson, 1226 cars. This was a decrease of 170 cars compared with the previous week. The combined shipments from the Connellsville and Masontown fields amounted to 14,222 cars, or 342,429 tons.

San Francisco. Feb. 8.

No change can be reported in the market for coal, or for fuel oil. Prices are stationary.

For coast coals, in large lots to dealers, prices are as follows: Wellington, New Wellington and Richmond, $8; Roslyn, $7; Seattle and Bryant, $6.50; Beaver Hill and Coos Bay, $5.50; White Ash, $5.25. For Rocky Mountain coals, in car lots quotations are: Colorado anthracite, $14; Castle Gate, Clear Creek, Rock Springs and Sunny Side, $8.50. Eastern coals are nominal at $14 for Pennsylvania anthracite, and $13 for Cumberland. For foreign coal quotations are, ex-ship; Welsh anthracite, $13; cannel, $8.50; Wallsend and Brymbo, $7.50 per ton.

Foreign Coal Trade.

Feb. 14.

The coal production of Germany for the year is reported as follows, in metric tons:

	1904.	1905.	Changes.
Coal.....	120,694,098	121,190,249	I. 496,151
Brown coal.....	48,500,222	52,473,625	I. 3,973,303
Total mined..	169,194,320	173,663,774	I. 4,469,454
Coke made.. ...	12,331,163	16,358,324	I. 4,027,161
Briquets made.	11,413,000	13,000,000	I. 1,587,000

The coal production would have been at least 5,000,000 tons greater but for the strike of a year ago and the car famine. Germany imported last year 9,399,693 tons of coal, as compared with 7,299,042 tons in 1904, while exports rose to 18,156,998 tons, as against 17,996,726 tons.

Iron Trade Review.

NEW YORK, Feb 14.

The iron and steel markets show little change from last week's report. Temporarily new orders are scarce, except in a few lines, such as plates and structural steel. Rails also show a number of new orders. Whether this is due to the fact that consumers are generally supplied as far ahead as they care to go, or whether there is a real cessation in demand, is a matter of varying opinion. As in such cases, usually, there are extremes which should be avoided, and the causes affecting the market are so complex that it is difficult to formulate definite statements.

It is certain that mills are supplied with work well over the first half of the year, and that the building and construction projects now on in hand will carry them well into the second half. Beyond that, much depends on the year's crops, and it will be some time yet before we are certain about them. At any rate, there is no present cause for apprehension.

Representatives of 20 independent bar

mills—all west of Youngstown, Ohio—met in Chicago Feb. 11, and organized the Western Bar Association. The following officers were elected: Sim C. Leonard, Detroit, president; George M. Clark, New Albany, Ind., vice president; James H. Nutt, Youngstown, Ohio, secretary-treasurer. The executive committee is composed of S. P. Llewellyn, East Chicago; R. M. Meyers, Terre Haute, Ind., and Sim C. Leonard, of Detroit.

Birmingham. Feb. 12.

Some few sales and an inquiry from conservative buyers, indicating that the market justified buying, have given the Southern pig-iron market renewed strength. The buying during the past week was not so active as it has been at times this year, but there were some sales made with delivery stipulated into the third quarter of the year. A statement coming from New York to the effect that several Birmingham iron men had entered a clique to sell iron abroad, and had taken a number of orders at from 25 to 50c. per ton under the prevailing quotations in this country, this being done to strengthen the domestic market, caused some smiles when information was sought upon the subject. If any foreign business has been booked in this district, under the published quotations, there is positively no admission. A prominent iron man said: "There are no reasons for seeking foreign business when all indications point to a steady need for iron right at home. I do not believe there has been a clique formed to sell iron abroad."

Reports are current here that Alabama furnace companies are behind in filling orders—in other words, there are some consumers who are urging shipment of their product ordered some time since. The shipments from this section of the country are active. The railroads are still handicapped because of the small amount of locomotive power.

The following quotations prevail: No. 1 foundry, $14.50; No. 2 foundry, $14; No. 3 foundry, $13.50; No. 4 foundry, $13; gray forge, $12.50; No. 1 soft, $14.50; No. 2 soft, $14.

There is no change in conditions at the steel plants at Ensley and Gadsden. The Tennessee Coal, Iron and Railroad Company has just completed a good order for the Illinois Central railroad, after which the Seaboard Air Line will come in for a large lot of 75-lb. rails. A number of other orders are on hand. The Southern Steel Company, formerly Alabama Steel and Wire Company, announces officially that in addition to rebuilding the nail mills, destroyed by fire at Ensley a few weeks ago, the wire-fence mill at Ensley will be enlarged and the steel plant at Gadsden will be enlarged one-half.

Cleveland. Feb. 13.

Iron Ore—Seemingly the only thing standing in the way of a tie-up of the lakes, by labor difficulties, is strife in some of the big organizations for the supremacy of one or two factions. The men are disposed to demand higher wages, since last season was so prosperous to the vessel owners. At the same time the open winter is promising an early opening of navigation, since the ice formation has been light.

Pig Iron—Shipments from furnaces to consumers are exceedingly heavy and seem to be all that the furnaces require. No one is offering to pay premiums for prompt shipment. At the same time buyers are holding off on future requirements and no new sales have been reported of any consequence. It is beginning to appear as if the buyers are expecting lower prices in the near future and will not cover their needs until they get satisfactory terms.

Finished Material—The unusually large production of plates and shapes, brought about by the increased capacity of the mills, is bringing easier conditions. This presents an uneven market where some mills are able to make immediate shipments on general orders, and others are not able to make deliveries for six to eight months. Some mills can make immediate deliveries on plates and others are getting premiums from $2 to $4 a ton on certain sizes. Bars are easy, with quick shipments offered from all the mills. Bar iron is easier, with the price easing off rapidly. Billets are down, due to the increased supply from the small mills, and in fact that market might be considered easy.

Chicago. Feb. 12.

Activity has characterized the local iron market in the last week, sales having been greater as regards both pig iron and finished products than in any previous week since the beginning of the new year. The change is attributed by furnace agents to the general using up of stocks on hand and contracted for by melters, with the result that heavy buying soon seems certain. The needs of the melters have been and continue to be large, and the condition of the iron-producing agencies does not warrant the hope of immediate overproduction such as to pull down prices. On some such analysis as this the present movement rests.

Sales are still chiefly of small lots for delivery soon, but several lots of 1000 to 3000 tons have been sold, and inquiries are for large quantities and delivery in the second and third quarters of the year. Northern and Southern are about equally in demand, the former being quoted on general sales at $19.25@$19.75 and the latter at $14.25@$14.75 Birmingham, or $17.90@$18.40.

Probabilities of a strike in the coal industry are bulling the market and this influence is likely to result in increasing sales. The coke market has stirred into activity since the talk of a coal strike became common, and Connellsville is holding up strongly to $5.15, with Southern cokes 25@50c. less.

New York. Feb. 14.

Pig Iron—A somewhat lower range of prices has been established, and this seems to have resulted in more inquiries for iron.

For Northern iron at tidewater we quote: No. 1X, $18.50@$19; No. 2X, $18.25@$18.50; No. 2 plain, $17.75@$18; forge $16.75@$17.25.

Basic is held at $19 for Virginia, $18.75 for Alabama, and $18.25 for Northern. Southern iron is also a little lower, though some makers decline any concession beyond the 25c. difference in freight. For large lots on dock quotations are: No. 1 foundry, $18.25@$18.75; No. 2, $17.75@$18.25; No. 3, $17.25@$17.75; No. 4, $16.75@$17.25; No. 1 soft, $18.25@$18.75; No. 2 soft, $17.75@$18.25; gray forge, $16.25@$16.75.

Cast-Iron Pipe—Prices are steady, the present basis being $29.75 per net ton for 6-in. pipe in carload lots at tidewater points. The foundries are all busy.

Bars—Business is fair and prices unchanged. Mills are asking 1.895@1.945 for common bars and 1.95@2c. for refined bars in large lots at tidewater. Steel bars are 1.745@1.795c., same delivery. Store trade is a little slow at 2.25, delivered.

Plates—Steel plates are in fair demand. Tank plates are nominally 1.745@1.825c.; flange and boiler, 1.845@1.945c.; universal and sheared plates, 1.745@1.845c.; according to width. Boiler makers are generally busy in this district.

Structural Material—Orders continue to come forward for building work. Prices are nominally unchanged. Beams under 15-in. are 1.845c. for large lots: over 15-in. 1.895c.; angles and channels, 1.845c., tidewater delivery. Jobbers ask a considerable advance on small orders.

Steel Rails—No change in standard sections. Light rails are in steady demand, prices ranging from $26 for 35 lb., up to $33 for 12 lb. rails. Orders for trolley rails are still coming.

Old Material—Dealers are more reasonable in their views. No. 1 railroad wrought can be had for $18@$18.50; No. 1 yard wrought, $17@$18; machinery cast, $14@$14.50; heavy steel melting scrap, $16@$17. These prices are on cars, Jersey City or other terminal delivery.

Philadelphia. Feb. 14.

Pig Iron—Eastern basic pig iron has been selling liberally on a basis of $18 per ton for early delivery. Negotiations are pending today for additional large lots of basic for later delivery. This territory is in need of considerable pig iron from basic to forge, and the negotiations now pending are being crowded as fast as possible by urgent buyers, who may be influenced to some extent by the possibilities of a lack of fuel later on. The

foundries, although by no means in need of iron for the next few months, are all showing a willingness to place orders for supplies for the second and third quarters. The mills in eastern and middle Pennsylvania are also duplicating orders in some instances for forge iron, and the smaller shops which buy in lots from 50 tons upward are also busying themselves with the market conditions. Interest in the market is by no means subsiding and it is impossible to forecast the probable future of prices or demand. Quotations for No. 1X foundry are $19.50; No. 2X, $18.50; No. 2 plain, $18; No. 2 southern, $18.75; gray forge best makes $17; basic, $18; bessemer, $19.50 and malleable, $19.

Steel Billets—The demand for steel billets continues active on a basis of $29 delivered for ordinary steel; for forging steel this week's business has been done at about $27.50.

Bars—Bar iron is selling at 1.83½ with a little more for certain sizes. Steel bars are bringing about the same money and are selling pretty close to card rates.

Sheets—Scarcely any business of importance has been done this week at the mills, but our city storekeepers are doing the average business.

Pipes and Tubes—Prices have slightly weakened in large lots, but there is no change in retail prices as the demand is good.

Merchant Steel—There is no change in quotations and buyers are looking forward to the maintenance of prices.

Plates—Some large orders have been placed during the past six days for plates and the inquiries which are being submitted show that some heavy requirements will soon have to be covered.

Structural Material—The rush for structural material keeps up and prices range from 1.83½ to 2c. The structural people say that the outlook is for a very stringent market during the coming summer and that their capacity will continue to be taxed to the close of the year.

Steel Rails—The last order of the Pennsylvania Railroad Co. for 12,500 tons of rails makes the aggregate of that company for this year's delivery 242,500 tons. It was said today that even this aggregate may be increased before long, but it is probable that the company will not be especially anxious to cover its needs for autumn months for some time to come.

Scrap—The scrap market is in a mixed condition. A good deal of negotiating is going on, but buyers are not so urgent as they were. Most of the larger scrap users have either a good deal of material piled up, or are protected by contracts. Old iron rails are quoted at $24.50; railroad scrap $21.50; No. 1 yard scrap $19; machinery scrap $16.50; No. 1 steel scrap $17.50; low phosphorous scrap will bring $23.50—when it can be had.

Pittsburg. Feb. 13.

The iron and steel markets are decidedly dull, so far as new business is concerned, but specifications on old contracts are heavy and in some lines of finished steel products, mills cannot guarantee delivery before the third quarter. A number of sales of bessemer pig iron in small lots for prompt delivery were made during the week and the price was $17.75, Valley furnace, but for second quarter it is said that $17.50 can be done. A strong effort is being made to keep up the market, as the price at which the United States Steel Corporation purchased its second quarter iron was guaranteed against a reduction. Foundry No. 2 is firmer than a week ago and while the price was down below $17.25, Valley, that rate is now the minimum and some furnaces are asking $17.50 and are making sales for prompt shipment at that figure. The market for gray forge continues strong and it is impossible to shade $17,35, Pittsburg. For the first time in over a year Southern forge delivered at Pittsburg is lower than Northern forge, the spread being about 50c. The latest quotation of Southern forge was $12.50, Birmingham, or $16.85, Pittsburg. All the furnaces are in operation. No iron is being stored, except possibly by foundries, and despite the drop in coke prices it is believed pig-iron prices will be firmly maintained. It is now declared that the high prices quoted for coke at the close of the year for first-quarter delivery were fictitious, and that the actual figures are now being named. One large producer emphatically stated today that at no time since the opening of the new year have more than 50 cars gone out of the region in one day at a higher price than $2.50 a ton for furnace coke. The ferro-manganese market is in rather a peculiar shape and it seems impossible to give an intelligent quotation. During the week one carload lot sold at $150 a ton, and smaller lots brought $165. One interest was selling at $90 a ton for delivery after July 1 but has no more to offer, and it is doubtful if any more can be had at that figure for the third quarter. The Carnegie Steel Company, the largest consumer of ferro in the Pittsburg district, is said to be well covered for the first half and third quarter.

All the steel mills in the district are being operated to capacity, but it seems impossible to catch up on deliveries in some of the important finished lines. Records of production are being broken almost daily in some of the mills. Announcement is made that the rod mill at Monessen of the Pittsburg Steel Company broke the world's record on the output of rods, last month's production being the largest ever made by any mill. In 52 turns of 12 hours each, the mill produced 14,045 gross tons, or an average of 605,000 lb. a turn. The demand for wire and wire products is improving and the demand for structural material continues heavy. The structural mills are not promising delivery on new business or specifications on old contracts before the third quarter. It is said that a great deal of work that has been contemplated is not being actively taken up, owing to the uncertainty of obtaining the material. Prices continue the same and are based on 1.70c. for beams and channels 15-in. and under. There has been an improvement in deliveries on plates; and on narrow sizes, some of the smaller mills are said to be shading prices which late last year were advanced $2 a ton, by cutting out the differential between narrow and wide plates. While iron bars have declined somewhat in the eastern and western markets the price here is firm at 1.85c. Pittsburg. Thre is no falling off in the demand for steel rails and the bulk of the prospective production for the year is now under contract.

Pig Iron—Sales of all grades of pig iron for the week aggregate about 10,000 tons. Bessemer was confined to small lots, there not being a sale of over 1,000 tons, the transactions being in 200 and 300 ton lots. Several thousand tons of foundry and forge iron were sold. Quotations this week are as follows: Bessemer $17.50@$17.75; basic $17@$17.25; foundry No. 2 $17.25@$17.50, all at Valley furnaces; gray forge, $17.35, Pittsburg.

Steel—Inquiries for billets for second quarter are being received, but no sales are recorded. There is still a scarcity and $27 is quoted for bessemer and $28 for open-hearth. Sheet-bars are $27. Steel bars continue at 1.50c. and pl tes at 1.60c.

Sheets—But little new business is being booked. Mills are busy on specifications on old contracts. Prices are firm on new orders on a basis of 2.40c. for black sheets and 3.45c. for galvanized for No. 28 gage.

Ferro Manganese—Sales of 80% ferro for first quarter shipment have been made at $150@$165 and for delivery after July 1 at $90 per ton.

Cartagena, Spain. Jan. 27.

Iron and Manganiferous Ores—Messrs. Barrington & Holt report that shipments for the week were three cargoes, 8,050 tons manganiferous ore, to Great Britain. Market conditions are unchanged, with a a strong tendency.

Quotations range a little higher. Ordinary 50 per cent. ore is 7s. 11d.@8s. 3d.; special low phosphorus, 8s.6d.@8s. 9d.; specular ore, 58 per cent. iron, 11s. 3d.; S. P. Campanil, 9s. 9d. All prices are f.o.b. shipping port. Manganiferous ores, same terms, range from 11s. for 35 per cent. iron and 12 manganese, up to 17s. 9d. for 20 iron and 20 per cent. manganese.

Pyrites—Iron pyrites, 40 per cent. iron and 43 sulphur, are quoted 10s. 3d. per ton, f.o.b. Cartagena. Exports were 46 tons to France.

Heavy Chemicals and Minerals.

NEW YORK, Feb. 14.

Nitrate of Soda—The combination of the West Coast producers will expire on Mar. 31, 1906. As is well known, uncertainty regarding this worked some irregularity in production and price last year; but attempts are in progress to readjust and hold the combination, with a view to regulation of production for a term of years.

Arsenic—Powdered white which has been quoted, "nominal 3 to 6 cents," has advanced to 10 or 12 cents in some cases for spot. This is hardly a real or permanent figure.

Phosphate—There is no advance as yet this side of the water; but 7½d. in quoted per unit in London on high-grade rock (77 to 80 per cent. c.i.f.) otherwise American quotations for the home market are as given in the table.

Heavy chemicals show little change in prices, though there is a general and decided tendency for the markets to become stronger. Figures for tin bichloride and crystals for the month are included in the prices given in the following table:

PRICES.

Alkalies.	
Soda ash, per lb	0.80@ 87½c,
Bicarb. soda, per lb	1.2@1.5c.
Bleaching powder, per lb	1¼c
Soda, caustic, per lb	1¾@2½c.
Salt cake, per lb	.65c
Sal soda, per lb	.6@1.4c
Soda, monohydrate, per lb	1¼@1¾c.
Potash, caustic, per lb	4½@6¼c.
Acids.	
Boric, crystals	per lb. .10
powdered	" .10½
Carbonic, liquid gas	" .12½
Hydrochloric	.0115@.015
Hydrofluoric, 30%	per lb. .03
48%	" .05
60%	" .11
Nitric acid, 36°, 100 lb	" $4.75
38°, 100 lb	" 5.25
40°, 100 lb	" 5.50
42°, 100 lb	" 5.75
Oxalic acid, com'l, 100 lb	$5.00@5 50
Sulphuric acid, 50°, bulb, for	13.50@14.50
60°, 100 lb. in carboys	1.00
60°, bulk, ton	18 00@20.00
66°, 100 lb. in carboys	1.25
66°, bulk, ton	21.00@23.02
Blue Stone (Copper Sulphate), carload lots, per 100 lb	5.90@6 05
Nitrate of Soda, 100 lb. 96% spot $4.25; future $2.22½	
Sulphate of Ammonia, per 100 lb	3,10@3.15
Sulphur.	
Louisiana to New York, Boston or Portland, ton	$22.12½
To Philadelphia or Baltimore, "	22.62½
Tin, bichloride per lb	.11
Crystals, per lb	.22½
Pyrite.	
Domestis, furnace size, Unit	11c.
Fines	" 10c.
Imported, lump, At. ports	" 10@11c.
" fines " "	" 9½@10c.
" furnace size	" 11½@12c.

Pyrite prices are per unit of sulphur. On lump deliveries, a charge of 25c. per ton is made for breaking to furnace size.

Phosphates.	F. O. B.	C. I. F. Gt. Britain. or Europe
*Fla., hard rock	$7.75@8.00	$10.90@12.10
land pebble	4.00@4.25	7.95@ 8.65
†Tenn., 78@80%	4.60@4.65	.....
78%	4.00@4.25	.....
75%	3.65@3.75	.....
68@72%	3.25@3.50	.....
‡So. Car. land rock	4.00@4.25	.....
river rock	3.75@4.00	.....

*F. o. b. Florida or Georgia ports. †F. o. b. Mt Pleasant. ‡On vessel Ashley River, S. C.

Metal Market.

New York, Feb. 14.

Gold and Silver Exports and Imports.

At all United States Ports in Dec. and Year.

Metal.	Exports	Imports.	Excess.
Gold:			
Dec. 1905 ..	$2,668,532	$3,982,040	Imp. $1,313,508
" 1904 .	13,502,827	3,336 184	Exp. 10,166,643
Year 1905..	46,794,467	50,246,564	Imp. 3,452,097
" 1904..	121,211.827	84,803,234	Exp. 36,408,593
Silver:			
Dec. 1905 ..	8,196,149	4,646 789	Exp. 3,549,360
" 1904 ..	4.114,861	2,252,955	" 1,861,706
Year 1905 ..	57,513.102	35,892,196	" 21,620,906
" 1904 ..	50,135.245	26,087.042	" 24,048,203

These statements cover the total movement of gold and silver to and from the United States. The figures are furnished by the Bureau of Statistics of the Department of Commerce and Labor.

Gold and Silver Exports and Imports, N.Y.

For the week ending February 10, and for years from January 1.

Period.	Gold.		Silver.	
	Exports.	Imports.	Exports.	Imports.
Week	.....	$ 49,908	$1,452,845	$ 115,176
1906	$ 1,053,875	238.678	10,931,748	286,199
1905	27,546,865	413.297	4,105,083	119,798
1904	1,027,597	1,227,185	5,675,906	160,736

There were no exports of gold for the week; those of silver went to London. Imports were from Mexico and the West Indies.

The statement of the New York banks—including all the banks represented in the clearing house—for the week ending Feb. 10 gives the following totals, comparisons being made with the corresponding week of 1904:

	1905.	1906.
Loans and discounts	$1,142,106,100	$1,061,997,200
Deposits	1,202,972,300	1,060,950,908
Circulation	43,025,100	51,449,800
Specie	222,571,000	190,894,500
Legal tenders	89,209,000	80,286,800
Total Reserve	$311,780,000	$271,181,300
Legal requirements	300,743,075	265,237,725
Surplus	$11,036,925	$ 5,943,575

Changes for the week this year were an increase of $4,632,100 in loans; decreases of $1,597,600 in specie, $3,699,500 in legal tenders, $452,200 in deposits, $529,100 in circulation and $5,184,050 in surplus reserves.

The following table shows the specie holdings of the leading banks of the world. The amounts are reduced to dollars:

	Gold.	Silver.	Total.
New York	.....	.....	$190,894,500
England	$167,876,780	.....	167,876,780
France	569,630,935	$211,628,240	781,259,175
Germany	179,680,000	59,895,000	239,575,000
Spain	75,260,000	116,060,000	191,320,000
Netherlands	33,035,000	30,526,500	63,561,500
Belgium	17,510,000	8,755,000	26.265,000
Italy	140,885,000	18,884,500	159,769,500
Russia	518,050,000	18,145,000	536,195,000
Austria	226,690,000	62,420,000	289,110,000

The returns of the Associated Banks of New York are of date Feb. 10 and the others Feb. 9. The foreign bank statements are from the *Commercial and Financial Chronicle*, of New York. The New York banks do not separate gold and silver in their reports.

Shipments of silver from London to the East are reported by Messrs. Pixley & Abell as follows for the year to Feb. 1:

	1905.	1906.	Changes.
India	£ 777,500	£ 2,087,300	I. £ 1,309,800
China	.....	.....	.....
Straits	2,800	.....	D. 2,800
Total	£ 780,300	£ 2,087,300	I. £ 1,307,000

Receipts for the week were £2,000 from Suez, £4000 from Australia, £288,000 bars and £107,000 Mexican dollars from New York; a total of £401,000. Exports were £254,000 bars and £230,400 Mexican dollars, a total of £484,400, all to India.

Indian exchange is firm, on a heavy demand for money in India. All the Council bills offered in London were taken at an average of 16.06d. per rupee. Shipments of silver to India continue heavy.

Prices of Foreign Coins.

	Bid.	Asked.
Mexican dollars	$0.51	$0.52½
Peruvian soles and Chilean	0.46½	0.48
Victoria sovereigns	4.85⅓	4.87½
Twenty francs	3.87	3.89
Spanish 25 pesetas	4.78	4.80

SILVER AND STERLING EXCHANGE.

Feb.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.	Feb.	Sterling Exchange.	Silver. New York Cents.	Silver. London, Pence.
8	4.87¼	65¾	30⅛	12	.....	.....	30⅝
9	4.87¼	65¾	30⅛	13	4.87	66⅛	30⅛
10	4.87	66	30⅜	14	4.86¾	66⅛	30⅛

New York quotations are for fine silver, per ounce Troy. London prices are for sterling silver, .925 fine.

Other Metals.

Daily Prices of Metals in New York.

February	Copper. Lake, Cts. per lb.	Copper. Electrolytic, Cts. per lb.	Copper. London, £ per ton.	Tin. Cts. per lb.	Lead. Cts. per lb.	Spelter. New York, Cts. per lb.	Spelter. St. Louis, Cts. per lb.
8	17⅞ @18⅛	17⅝ @17⅞	78⅛	36⅛	5.60	6.05 @6.10	5.90 @5.95
9	17⅞ @18⅛	17⅝ @17⅞	78⅛	36⅛	5.60	6.05 @6.10	5.90 @5.95
10	17⅞ @18⅛	17⅝ @17⅞	. . .	36¼	5.60	6.05 @6.10	5.90 @5.95
12	.....	.....	78	....	....	.....	.....
13	17⅞ @18⅛	17⅝ @17⅞	78	36⅛	5.60	6.05 @6.10	5.90 @5.95
14	17⅞ @18⅛	17⅝ @17⅞	78	36⅛	5.35	6.05 @6.10	5.90 @5.95

London quotations are per long ton (2,240 lb.) standard copper, which is now the equivalent of the former g. m. b's. The New York quotations or electrolytic copper are for cakes, ingots or wirebars. The price of cathodes is usually 0.125c. below that of electrolytic. The lead prices are those quoted by the American Smelting & Refining Co. for near-by shipments of desilverized lead in 50-ton lots, or larger orders. The quotations in spelter are for ordinary western brands; special brands command a premium.

Copper—A larger business has been transacted at current figures during the week than for quite some little time past. This has at last demonstrated that present prices are attracting more attention and that manufacturers have again entered the market. Demand for export is still lacking. Prices do not show any change and we quote 17⅞@18⅛c. for Lake; 17⅝@17⅞c. for electrolytic in ingots, cakes and wirebars; 17½@17⅝c. for casting copper.

The speculative market in London moved within very narrow limits and fluctuations during the week did not amount to more than 15s. The market closes steady at £78 for spot, £76 for three months.

Refined and manufactured sorts we quote: English tough, £82@£83; best selected £83@£84; strong sheets, £89.

Exports of copper from New York for the week were 1917 long tons. Our special correspondent reports the exports from Baltimore at 2011 long tons of fine copper.

Tin—The demand has been very limited and prices over here are following closely London quotations. The stock of spot tin is decreasing gradually and should a larger demand for this metal spring up, there is no doubt that a premium for spot deliveries would again be established. The market closes firm at 36.50@36.75, depending upon deliveries.

The foreign market fluctuated from day to day, and while at the end of last week the quotations were £164 15s. for spot, £163 10s. for three months, the close is strong at £167 2s. 6d. for spot, £165 10s. for three months.

Lead remains very dull, with little desire on the part of consumers to operate. The American Smelting and Refining Company reduced its prices on Feb. 14 to 5.35 New York, 5.17½ St. Louis, being a decline of 0.25c. per pound.

The London quotations have declined about 10s. While the middle of last week the market was quoted £16 5s., it closes this week at £15 15s. for Spanish lead, £15 17s. 6d. for English lead.

The movement of foreign lead in the United States for the year is reported by the Bureau of Statistics as below, the figures given being in short tons:

In bond, Jan. 1	11,481
Imports for the year	98,378
Total supplies	109,859
Re-exports	59,455
In bond, Dec. 31	8,148
Total deductions	67,603
Balance	42,256

This indicates a consumption here of over 42,000 tons of foreign lead last year.

The export of lead from Spain to the United Kingdom during 1905 was 106,610 tons as against 110,851 tons for the previous year; showing a decrease of 4241 tons.

St. Louis Lead Market.—The John Wahl Commission Co. reports on Feb. 10 as follows: Receipts amounted to 41,620 pigs, against 29,865 the previous week. Market weak and inactive at 5.52½c.; today not over 5.50c. is generally quotable, though 5.55c. is reported for a single car.

The company telegraphs us on Feb. 14 as follows: Lead is firm, but rather dull; Prices for both desilverized and Missouri brands are 5.52½c., nominally.

Spelter—Nothing new is to be reported about this market. Consumers still continue to hold aloof, and the few orders which present themselves are eagerly competed for. Prices close weak at 6.05@6.10 New York, 5.90@5.95 St. Louis.

The London market also has become very much weaker and quotations at the close are cabled as £25 10s. for good ordinaries, £25 15s. for specials.

St. Louis Spelter Market—The John Wahl Commission Co., on Feb. 10 reports as follows: Receipts 55,260 slabs, against 61,750 the previous week. No change in the market, 5,92½c. being the general price. Today 5.90c. was bid for ordinaries.

The company telegraphs us on Feb. 14 as follows: Spelter is a little unsettled; latest sales are on a basis of 5.95c. East St. Louis. Offerings at the late decline are rather limited, and the metal looks cheap.

Spanish Zinc Ore Market—Messrs. Barrington & Holt report from Cartagena, Spain, under date of Jan. 27, that prices are nominally unchanged at 95 fr. for blende, 35% zinc, and 72 fr. for calamine, 30% zinc. The market is weaker than it has been.

Zinc Sheets—The price of zinc sheets is $7.75 per 100 lb. (less discount of 8%). f.o.b. cars Lasalle and Peru, in 600-lb. casks, for gages No. 9 and 22, both inclusive, widths from 32 to 60 in., both inclusive, and lengths from 84 to 96 in., both inclusnve. The freight rate to New York is 27.5c. per 100 lb. The fluctuations in the base price for sheet zinc since January 1, 1905, have been as follows: December 30, 1904, $7.25; January 7, 1905, $7.50; May 12, $7.25; June 1, $7; July 29, $7.25; August 10, $7.50; December 1, $7.75; January 6, 1906, $8; Feb. 5, $7.75.

Antimony—In consequence of an order, said to amount to 200 tons, which was placed by the German Government, the market for this metal toward the end of last week became extremely strong, and prices advanced to 17c. for Cookson's, 16c. for Hallett's and 15@15½c. for other brands.

Nickel—Quotations for large lots, New York, or other parallel delivery, are 40@47c. per lb., according to size and condition of order. For small quantities, prices range from 48 up to 60c., also according to size of order and deliveries.

Platinum—Prices of this metal are unsettled, owing to short supplies, and the present unfortunate conditions in Russia making shipments from that country uncertain. Prices continue about $25 per ounce, but changes are likely to occur.

Quicksilver—The metal is firm and New York prices are still $41 per flask of 75 lb. for lots of 100 flasks or over, and $42 for small lots down to 10 flasks. For retail quantities, under 10 flasks, pound prices are charged, which work out to $43.50@$44 per flask. San Francisco prices are firm at $39.50 for domestic orders and $38 for export. The London price is £7 7s. 6d. per flask, but jobbers ask £7 10s. for moderate lots.

Manganese Alloys—Prices for these alloys in Germany are given by Paul Speier as below. The prices are for orders of not less than 50 kg. delivered in Bremen, and are as follows, per 100 kilograms:

	Marks.
Manganese copper, No. 1, 30% Mn	275
No. 2, 28% Mn	180
No. 3, 20 to 25%, with 2 to 4% iron	165
Manganese tin, No. 1, 55% Mn., no iron	480
No. 2, 56% Mn., some iron	280
Manganese nickel, No. 1, free from iron	450
No. 2, traces of iron	270

Manganese metal is quoted at 3 marks per kg.—38.8c. per lb.—delivered in Bremen. These alloys are made by the Isabellenhütte, in Bonn, Germany, which is represented by Mr. Speier in Breslau as selling agent.

Minor Metals—For minor metals and their alloys, wholesale prices are f.o.b. works:

Aluminum.	Per lb.
No. 1, 90% ingots	33@37c.
No. 2, 99% ingots	31@34c.
Rolled sheets	4c. up.
Aluminum-bronze	20@23c.
Nickel-alum	33@39c.
Bismuth	$2.10
Cadmium, f. o. b. Hamburg	77c.
Chromium, pure (N. Y.)	80c.
Copper, red oxide	50c.
Ferro-Molybdenum (50%)	95c.
Ferro-Titanium (20@25% N. Y.)	75c.
Ferro-Chrom. (75%)	12½c.
Ferro-Tungsten (37%)	29c.
Magnesium, pure (N. Y.)	$1.60
Manganese (98@98% N. Y.)	75c.
Manganese Cu. (30@70% N. Y.)	40c.
Molybdenum (98@99% N. Y.)	$1.75
Tantalic acid (N. Y.) (oz.)	49c.
Phosphorus, foreign	45c.
Phosphorus, American	70c.
Tungsten (best), pound lots	90c.

Variations in price are chiefly due to size and conditions of order and deliveries.

Missouri Ore Market.

JOPLIN, Feb. 10.

The highest price paid for zinc was $54 per ton, the same as has been paid every week this year, and the assay basis remains unchanged at prices ranging from $50 down to $45 per ton of 60 per cent. zinc. The average price of the week was $46.48 per ton.

Sharp competition between a local lead

smelter and the representative of the St. Louis Smelting and Refining Company keeps the price of a few large bins of choice lead ore at a wide variance from the general prices for 80 per cent. grades. The highest price was $78.50 with 80 per cent. grades selling at $73. The average price was $73.48.

The zinc producers of the district are elated at having secured an order from the United States attorney-general directing that an import duty be charged on all imported zinc sulphide ores improved by treatment. Buyers assert that this ruling will not prevent a single pound of importation, contending that no zinc sulphide ores improved by treatment have ever been imported without a duty except the Mexican sulphide, which pays a duty of $5 to $7 per ton on the lead contents.

Following are the shipments of zinc and lead from the various camps of the district for the week ending today:

	Zinc, lb.	Lead, lb.	Value.
Carterville-Webb City..	2,254,520	693,500	$79,790
Joplin	2,050,990	200,000	57,550
Duenweg	468,380	176,670	17,775
Galena-Empire	460,370	100,200	14,110
Aurora	446,390	.....	10,650
Badger-Peacock	412,030	.....	10,300
Alba	300,300	46,560	9,220
Granby	493,050	25,000	8,170
Carthage	245,980	.....	6,150
Neck City	214,240	.....	5,355
Oronogo	187,660	4,930	4,250
Zincite	151,740	3,940	3,780
Spurgeon	170,330	24,640	3,660
Baxter Springs	137,850	.....	2,760
Sarcoxie	127,110	.....	2,225
Central City	62,320	11,210	1,820
Prosperity	40,130	15,260	1,465
Totals	8,223,390	1,301,910	$239,030
Last week	8,799,080	1,611,320	$263,470
Same week last year	6,244,840	378,640	173,890

Zinc value, this week, $191,190; 6 weeks, $1,348,215.
Lead value, this week, 47,840; 6 weeks, 317,530.

The following table shows the average monthly prices of zinc and lead ores in Joplin, by months:

ZINC ORE AT JOPLIN.			LEAD ORE AT JOPLIN.		
Month.	1905.	1906.	Month.	1905.	1906.
January	52.00	47.38	January	61.50	75.20
February	52.77	....	February	57.62	....
March	47.40	....	March	57.20	....
April	42.88	....	April	58.00	....
May	43.31	....	May	58.27	....
June	40.75	....	June	57.80	....
July	43.00	....	July	58.00	....
August	48.83	....	August	58.00	....
September	46.75	....	September	63.50	....
October	47.60	....	October	63.86	....
November	49.55	....	November	68.67	....
December	49.00	....	December	76.25	....

Wisconsin Ore Market.

PLATTEVILLE, Feb. 10.

The ore buyers were not very active this week. Word got out among the sellers that there was to be a cut, and the usual activity was lacking. The general trend of the market seems to be upward. The price of 60 per cent. zinc was $50, strong. Several fancy lots brought $54, and one hand-cobbed carload was sold for $54.50. The price of lead stiffened up and one lot was reported as having brought $35 per thousand.

The different camps of the Platteville district loaded as follows:

	Zinc, Lb.	Lead, Lb.	Sulphur, Lb.
Platteville	428 130	58,000	... .
Mineral Point	245,560	. ...	.....
Linden	221.310	.....	.....
Cuba City	180,000	.....	.....
Benton	140,000	.....	.....
Highland	120,000	.....	.....
Buncombe-Hazel Green..	118,400	.....	.....
Dodgeville	117,000	60,000	68,000
Shullsburg	114 000	.....	.....
Livingston	62,000	.....	.....
Montfort	.....	.. .	65,800
Total	1,746,390	118,000	133 800
Total from Jan. 1	9,670,540	221,000	1,755,040

Some of the outlying camps report difficulty in securing cars in which to load their ore.

Mining Stocks.

New York. Feb. 14.

The market generally has been irregular. On the Exchange interest centered in the copper stocks, and reiterated reports were circulated of a consolidation of the Amalgamated, Heinze and other interests. The final solution of these reports will be found in our news columns. Amalgamated Copper closes at $117; United Copper common at $74, after selling at $77½. Anaconda sold at $75 per share.

On the New York Exchange, Federal Mining and Smelting showed transactions at $180 for the common and $108 for the preferred; there were sales of Homestake at $81¼, Standard Consolidated at $4.50. Alice at $4. Quicksilver preferred at $3.

On the curb there was interest in the coppers, but no great changes in quotations.

On the Consolidated Exchange little was done in the Comstocks and Tonopahs. Of other stocks, Iron Silver sold at $5. Ontario at $2.75, Mollie Gibson at 9c., after a long rest.

Boston. Feb. 13.

It has again been a week of specialties in the mining-share market, but firm throughout the list. Amalgamated touched $118 today on announcement of the settlement of the mining warfare in Montana, but afterward worked off to below $117 on profit-taking. United Copper, which yielded $4 to $73.87½, rose sharply to $77.75 today. Now that there is an end to these warring factions, many millions of money will be saved and mines that have been idle for years will again become producers. Bingham Consolidated touched $50 on reports that Heinze had become interested in the property, but closed at a recession of $2 from this. Old Dominion had a short spurt to $45.50 on knowledge that concentrating sulphide ore has been struck in cross-cutting at the fourteenth level, which runs between 2 and 3 per cent. copper. The fact that the company has struck ore which is a proper flux is the best news that could be had. The stock yielded to $42.50 later.

The rupture at the Quincy mine caused the stock to drop sharply to $90, from which it has recovered $10. The close a week back was $106. The full significance of the accident can hardly be known for some time, but at present all operations are suspended, except at No. 8 shaft. Calumet & Hecla is up $15 to $720, and Parrot is up $2 to $43.50. A regular quarterly dividend of 50c. was announced by the latter company today. Winona is off to $6. A $1 assessment has been levied, payable Feb. 26, which will yield $100,000 for development work, etc. This makes total of $12 paid in. A $2 call on Michigan stock is expected to build a mill. Allouez spurted from $37.75 to $43.25, but yielded to $41 today. The average mineral per ton of rock stamped last month was but 33.09 per cent., against 46.58 for December; but this was due to the fact that there was no selection of the rock.

A Canadian pool has succeeded in putting Dominion Iron & Steel up almost $4 to 32.87½. Nevada Consolidated is up $2.37½ to $15 and North Butte closed $1.25 above a week ago, at $88.25. The latter is said to have earned over $400,000 net for January.

The first definite move of the Coram's American Consolidated Copper Company was announced last week, when deposits of Montana Coal and Coke stock were asked for in exchange for the former in the proportion of one for eight shares of the latter. The first issue of stock of the American company is 365,000 of the 1,500,000 shares. The first "unit" has been underwritten at $80 per share. Montana Coal and Coke touched $7.50 today.

Stockholders of Greene Consolidated received quite a jolt today when announcement was made that the stock had been struck from the Boston Stock Exchange list. As a result it fell $1.75 to $26.50 on the curb and the rights fell from 23 to 15. The company, in closing the book ten days previous to official action on the new stock issue, did not give the Stock Exchange proper notice, as it agreed to. As a result transactions made on and after Feb. 1 entitle the buyer to a due bill for the rights pertaining to them. It is hoped that the matter can be remedied later, as it was not done maliciously. Eagle and Blue Bell, controlled by Bingham, has been the curb feature, rising $1.75 during the week to $4.

Colorado Springs. Feb. 9.

The mining market on the local exchange has been quite active during the past week, although erratic. Several stocks have scored advances and taken just as sudden a decline. El Paso has been sliding from 93¼ to 77½, but returned to 90 on today's market. Elkton remains quite stationary around 46¼c. Findley has declined from 91½ to 88½c. Portland declined a few cents, selling on today's market for $1.80. Vindicator remains around 97@99c. Isabella is selling for 25¼c. Old Gold has been quite active and sold today for 6¾c. Stratton's Independence has about decided to build a 500-ton mill, but the process has not yet been determined.

San Francisco. Feb. 8.

The Comstocks were more active than usual during the week, the demand being especially for the middle and Gold Hill shares. Prices had some advance.

The Tonopah shares on the other hand, were quieter. Demand settled on a few stocks, the rest being dull, with prices rather heavy.

Oil shares have been quiet, with only few transactions, and a moderate demand from buyers. Prices for the better class, however, are firm.

Dividends.

Company.	Payable.	Rate.	Amt.
Amalgamated Copper	Feb. 26	$1.50	$2,296,319
Am. Smelters, A. pfd.	Mch. 1	1.50	255,000
Am. Smelters, B. pfd.	Mch. 1	1 25	375,000
Bunker Hill & Sullivan	Feb. 5	0.60	180,000
General Asphalt, pfd.	Mch. 1	2.00	262,800
General Chemical	Mch. 7	2.00	148,206
Greene Con. Copper	Feb. 28	0.40	345,600
Homestake	Feb. 26	0.50	109,200
International Salt	Mch. 1	1 00	187,500
Jeff. & Clearfield C. & I. pf.	Feb. 15	2.50	37,500
Quincy Copper	Feb. 26	5.00	509,000
Red Top, Nev.		0.05	
Standard Con., Cal.	Feb. 23	0.10	18, 394
U. S. Steel, pfd.	Feb. 28	1.75	6,304·919

*Monthly. §Bi-monthly. †Quarterly. ‡Semi-Annually.

Assessments.

Company.	Delinq.	Sale.	Amt.
Alpha Con.	Jan. 31	Feb. 21	$0.05
Andes	Mar. 9	Mar. 30	0.10
Apollo Con.	Feb. 19		0.10
Belcher	Feb. 14	Mar. 7	0 10
Best & Belcher	Feb. 9	Feb. 28	0.10
Butler Liberal, Utah			0.02
Caledonia	Feb. 16	Mar. 9	0.10
Con. Cal & Virginia	Feb. 13	Mar. 6	0.25
Con. Imperial	Feb. 14	Mar. 13	0 01
Dutch, Cal.	Feb. 27		0.08
Exchequer	Feb. 14	Mar. 7	0.05
Hale & Norcross	Mar. 2	Mar. 27	0.10
Justice	Feb. 27	Mar. 19	0.05
Mexican	Feb. 7	Feb. 28	0.15
New Bunker Hill, Cal.	Mar. 7		0.05
Pilot, Cal.	Mar. 3		0.03
Providence, Utah.	Feb. 5	Mar. 12	0.00½
Potosi	Feb. 5	Feb. 27	0.10
St. John Quartz	Jan. 27		0.05½
Vespasian-Hoogley	Feb. 12	Feb. 28	0.012

Tonopah Stocks. Feb. 14.

(Revised by Weir Bros. & Co., New York.)

	High.	Low.	Last.
Tonopah Mine of Nevada	19.00	18.00	19.00
Tonopah Montana	2.80	2.75	2.80
Tonopah Extension	15.00	9.75	12.00
Tonopah Midway	1.93	1.90	1.92
Tonopah West End	2.40	2.35	2.35
Goldfield Mining Co.	.73	.70	.72
Jumbo Mining	1.70	1.60	1.70
Red Top	2.00	1.90	2.00
Sandstorm	1.60	1.55	1.60
Montgomery Shoshone	4.65	4.50	4.65
Eclipse-Bullfrog	.80	.76	.79
Denver-Bullfrog	1.05	1.00	1.05

St. Louis. Feb. 13.

	High.	Low.
Adams	$ .40	$ .25
American Nettie	.15	.10
Center Creek	2.70	2.40
Central Coal & Coke	61.50	60.00
" " " pfd.	80.00	79.00
Central Oil	60.00	55.00
Columbia	1.25	.50
Con. Coal	25.00	22.00
Doe Run	145.00	137.00
Granite Bimetallic	.35	.29
St. Joe	35.00	29.00

LONDON. (*By Cable.**) Feb. 14.

	£	s.	d.
Dolores	1	18	9
Stratton's Independence	0	7	9
Camp Bird	1	8	3
Esperanza	4	9	6
Tomboy	1	7	6
El Oro	1	7	0
Oroville	1	1	6
Arizona Copper, pf.	3	6	0
Arizona Copper, def.	3	5	6

*Furnished by C. Schumacher & Co., New York.

STOCK QUOTATIONS.

NEW YORK. Week Feb. 14.

Name of Company,	High	Low	Clg.	Sales
Amalgamated	118¼	113¼	116⅞	538,985
Anaconda	200	272	294⅜	250,700
Boston Copper	30½	29	29⅜	18,800
British Col. Copper	9⅛	9½	9½	5,460
Federal	190	180	190	1,900
Federal, Pf.	109¾	105⅜	108	5,600
Greene Copper	28	27	27	7,250
Greene Gold	3½	3⅜	3½	1,890
Homestake	82	81¼	82¼	250
Mitchell	13	12½	12⅜	1,883
Ontario				
Tennessee Copper	48	46½	46½	2,600
Union Copper	1 1/16	1 1/16	1 1/16	1,000
United Copper,	79	73	77½	129,500
United Copper, Pref.	102¾	101½	101½	200
Utah Apex	7½	6½	6⅝	1,800
Utah Copper	33⅞	32	31⅛	3,229

NEW YORK INDUSTRIALS.

Am. Smelting & Ref.	166¼	161	164¼	120,800
Am. Smelting & Ref., Pf.	126	125½	126	3,300
Col. Fuel & Iron	74⅛	70⅞	71½	69,000
National Lead	86	82	84½	6,500
Pittsburg Coal	16	15	16	900
Pittsburg Coal, pf.	58	57	57¾	400
Republic I. & S.	35⅞	33⅝	34½	13,900
Republic I. & S., Pf.	108¼	107	107¾	2,900
Tenn. C. & I.	160	155	156½	5,000
U. S. Red. & Ref.	27	27	27	200
U. S. Red. & Ref., Pf.	68	66½	68	600
U. S. Steel	45⅛	43½	44	378,750
U. S. Steel, Pf.	110½	108¾	109⅛	71,535
Standard Oil	697½	692½	697½	. 242
Bethlehem Steel	33	32½	32½	118

BOSTON.

Allouez	43¾	39¾	40¾	2,080
*Amalgamated	118	113⅞	117	51,322
Atlantic	25½	25	25	1,510
Bingham	50	47¾	48	65,842
Boston Consolidated	31½	29	29⅝	22,600
Calumet & Hecla	720	705	720	215
Centennial	29	28	27¾	748
Mercur	65	64	65	1,100
Copper Range	83½	81⅝	82⅛	6,456
Daly-West	17	16	16	1,922
Franklin	21	19½	20	8,174
Granby	10¼	10	10	1,259
Green Con. Copper	25¼	27⅛	27⅞	2,173
Isle Royale	25½	24½	25	1,582
†Mass	10¾	10¼	10¾	395
Michigan	15	14	14	1,270
Mohawk	59	58	58¼	553
North Butte	89	86½	88	5,266
Old Dominion	45½	36½	44	16,544
Osceola	102	100	100½	817
Parrot	43½	40	43	5,269
Quincy	105	90	99	654
Rhode Island	7⅜	6⅛	6½	775
Shannon	6½	6⅛	6⅜	2,250
Tamarack	110	107	107	30
Tecumseh	15	13½	14	905
*United Copper, com	78⅜	73½	78¼	14,608
U. S. Smg. & Ref.	61½	59	60	4,494
" " pfd.	46½	45	44⅞	9,383
Utah	65½	64	64½	5,832
Wolverine	134⅞	133	134⅞	582

PHILADELPHIA.

Cambria Steel	37	34½	36⅜	26,574
Philadelphia Co.	53¼	52¾	53⅛	4,454
Tonopah	18¾	17⅝	18½	2,060

PITTSBURG.

Crucible Steel	16¾	16	16¾	3,672
Crucible Steel, Pref.	79⅞	78¾	79⅝	1,303
Tonopah Ext.	9.55	8.31	9.50	12,280

COLORADO SPRINGS.

Name of Company.	First	High	Low	Clg.
Elkton	46	46½	46	46½
El Paso	91	87⅞	87⅞	87⅞
Isabella	25⅛	27¾	25⅛	27¾
Portland	180	180	180	180
Vindicator	97	98	96½	96½

SAN FRANCISCO.

Best & Belcher	1.25	1.20	1.20	1.20
Bullion	.27	.29	.25	.25
Caledonia	.44	.46	.41	.41
Confidence	.75	.75	.70	.70
Con. Cal. & Va.	1.20	1.45	1.20	1.40
Gould & Curry	.16	.17	.15	.17
Hale & Norcross	.91	.95	.85	.85
Mexican	1.30	1.25	1.25	1.25
Occidental Con	.92	.92	.92	.92
Ophir	6.01⅛	6.01⅛	5.75⅛	5.75
Savage	.41	.41	.39	.41

*Ex-dividend. †1st Installment Paid.
Assessment Paid. §2d Installment Paid.

Monthly Average Prices of Metals.

SILVER.

Month.	New York.		London.	
	1905.	1906.	1905.	1906.
January	60.690	65.288	27.930	30.113
February	61.023	.....	28.047	.....
March	58.046	.....	26.794	.....
April	56.600	.....	26.108	.....
May	57.832	.....	26.664	.....
June	58.428	.....	26.910	.....
July	58.915	.....	27.163	.....
August	60.259	.....	27.822	.....
September	61.695	.....	28.528	.....
October	62.034	.....	28.637	.....
November	63.849	.....	29.493	.....
December	64.850	.....	29.977	.....
Year	60.352	.....	27.839	.....

The New York prices are in cents per fine ounce; the London quotation is in pence per standard ounce, .925 fine.

COPPER.

	NEW YORK.				LONDON.	
	Electrolytic.		Lake.			
	1905.	1906.	1905.	1906.	1905.	1906.
Jan.	15.008	18.310	15.128	18.416	68.262	78.896
Feb.	15.011	.....	15.136	.....	67.963	.....
March	15.125	.....	15.250	.....	68.174	.....
April	14.920	.....	15.045	.....	67.017	.....
May	14.627	.....	14.820	.....	64.875	.....
June	14.673	.....	14.813	.....	65.881	.....
July	14.888	.....	15.005	.....	66.887	.....
Aug.	15.664	.....	15.725	.....	69.830	.....
Sept.	15.965	.....	15.978	.....	69.667	.....
Oct.	16.279	.....	16.332	.....	71.406	.....
Nov.	16.599	.....	16.758	.....	74.727	.....
Dec.	18.328	.....	18.398	.....	78.993	.....
Year.	15.590	.....	15.699	.....	69.465	.....

New York prices are in cents per pound. Electrolytic quotations are for cakes, ingots or wire bars. The London prices are in pounds sterling, per long ton of 2,240 lb., standard copper.

TIN IN NEW YORK.

Month.	1905.	1906.	Month.	1905.	1906.
Jan.	29.325	36.390	July	31.760	.....
Feb.	29.262	.....	August	32.866	.....
March	29.523	.....	Sept	32.095	.....
April	30.525	.....	Oct	32.481	.....
May	30.049	.....	Nov	33.443	.....
June	30.329	.....	Dec	35.835	.....
			Av. year.	31.358	.....

Prices are in cents per pound.

LEAD IN NEW YORK.

Month.	1905.	1906.	Month.	1905.	1906.
Jan.	4.552	5.600	July	4.524	.....
Feb.	4.450	.....	Aug.	4.665	.....
March	4.470	.....	Sept.	4.850	.....
April	4.500	.....	Oct.	4.850	.....
May	4.500	.....	Nov.	5.200	.....
June	4.500	.....	Dec.	5.422	.....
			Av., year.	4.707	.....

Prices are in cents per pound. The London average for January, 1906, was £ 16.850 per long ton.

SPELTER.

Month.	New York.		St. Louis.		London.	
	1905.	1906.	1905.	1906.	1905.	1906.
Jan.	6.190	6.487	6.032	6.337	25.062	28.225
Feb.	6.139	.....	5.989	.....	24.594	.....
Mar.	6.067	.....	5.917	.....	23.825	.....
April	5.817	.....	5.667	.....	23.813	.....
May	5.434	.....	5.284	.....	23.594	.....
June	5.190	.....	5.040	.....	23.875	.....
July	5.396	.....	5.247	.....	23.938	.....
Aug.	5.706	.....	5.556	.....	24.675	.....
Sept.	5.887	.....	5.737	.....	26.375	.....
Oct.	6.087	.....	5.934	.....	28.225	.....
Nov.	6.145	.....	5.984	.....	28.500	.....
Dec.	6.522	.....	6.374	.....	28.719	.....
Year.	5.882	.....	5.730	.....	25.433	.....

New York and St. Louis prices are in cents per pound. The London prices are in pounds sterling per long ton (2,240 lb.) good ordinary brands.

CHEMICALS, MINERALS, RARE EARTHS, ETC.—CURRENT WHOLESALE PRICES.

(See also Market Reviews.)

ABRASIVES—		
Bort as to size	carat	$10.00@$18.00
Carborundum, f.o.b. Niagara Falls, powd	lb.	.08
Grains	"	.10
Corundum, N. C	"	.07@.10
Chester, Mass	"	.04½@.05
Craigmont, Ont	"	.05½@.06½
Mont. f.o.b. Chicago	"	.07@.07½
Crushed Steel, f.o.b. Pittsburg	"	.05½
Emery, in kegs: Turkish flour	"	.03½
Grains	"	.05@.05½
Naxos flour	"	.03½
Grains	"	.05@.05½
Chester flour	"	.03½
Grains	"	.05@.05½
Peekskill, f.o.b. Easton, Pa., flour	"	.01½
Grains, in kegs	"	.02½
Garnet, per quality	ton	25.00@35.00
Pumice Stone, Am. Powd	lb.	.01 3-5@.02
Italian, powdered	"	.01½@.01⅝
Lump, per quality	"	.04
Rottenstone, ground	"	.02½@.04½
Lump, per quality	"	.06@.20
Rouge, per quality	"	.10@.30
Steel Emery, f.o.b. Pittsburg	"	.07
ALCOHOL—Grain	gal.	2.38
Refined wood, 95@97%	"	.70@.75
Purified	"	1.25@1.30
ALUM—Lump	100 lb.	1.75
Ground	"	1.85
Chrome Alum	lb.	0.05
ALUMINUM—Sulphate, com'l.	"	75@1.25
AMMONIUM—		
Bromide	lb.	.22
Carbonate	"	.08
Muriate grain	"	.06@.06½
Lump	"	.09½
Sulphocyanide com	"	.25
" " chem. pure	"	.35
ARSENIC—White (nominal)	"	.03½@.07½
Red	"	.06½@.07
ASPHALTUM—		
Barbadoes	"	.02½@.03
Cuban	"	.01½@.03½
Egyptian, crude	"	.06@.07
Gilsonite, Utah ordinary	"	.03@.03½
Trinidad	"	35.00
BARIUM—		
Carb. Lump, 80@90%	sh ton.	25.00@27.00
92@98%	"	28.00@29.00
Powdered 80@90%	lb.	.01½@.02
Chloride com'l	ton.	32.00@38.00
Chem. pure cryst	lb.	.05
Nitrate, powdered, in casks	"	.06
Sulphate (Blanc Fixe)	"	.02
BARYTES—		
Am. Crude No 1	sh. ton.	9.75
Crude No. 2	"	8.00
Crude No. 3	"	7.00
Floated	"	18.00@19.00
Foreign floated	"	20.00
Snow-white	"	17.25@18.75
BAUXITE—Ga. or Ala. Mines:		
First grade	lg. ton.	5.25@5.50
Second grade	"	4.50@4.75
Arkansas, first grade	lg. "	5 00@5.50
Second grade	"	4.50@4.75
Washed ore	"	6.00@7.00
BISMUTH—Sub-nitrate	lb.	1.50
BLEACHING POWDER—35%,	100 lb.	$1.25@1.30
BONE ASH	lb.	.02½@.02½
BORAX	"	.07½@.07½
CALCIUM—Acetate, gray	"	2.35
Acetate, brown	"	1.60@1.65
Carbide, ton lots f.o.b. Niagara Falls, N. Y., for Jersey City, N. J.	sh. ton.	65.00
Chloride, f.o.b. works	"	9.00@10.00
CEMENT—		
Portland, Am. 500 lb.	bbl.	1.55@1.60
Foreign	"	1.25@1.75
"Rosendale," 300 lb.	"	.85
(in sacks)		.65
Slag cement	"	.75@1.25
CHLORINE—Liquid		.30
Water		.10
CHROME ORE—		
(50%) ex-ship N. Y.	lg ton.	18.50@19.00
Bricks, f.o.b. Pittsburg. M.	"	175.00
CLAY, CHINA—Am. common ex-dock, N. Y.	"	7.75@8.00
Am. best ex-dock, N. Y.	"	8.00
English, common	"	12.00
COBALT—Oxide	lb.	2.60
COPPERAS—Bulk	100 lb.	$0.47½
In bbls	"	.57½
In bags	"	.062½
CRYOLITE	lb.	.06½
EXPLOSIVES—		
Blasting powder, A	25-lb. keg	.65
Blasting powder, B	"	1.40
"Rackarock," A	lb.	.25
"Rackarock," B	"	.18
Judson R.R. powder	"	.10
Dynamite (20% nitro-glycerine)	"	.13
(30% nitro-glycerine)	"	.14
(40% nitro-glycerine)	"	.15
(50% nitro-glycerine)	"	.16½
(60% nitro-glycerine)	"	.18
(75% nitro-glycerine)	"	.21
Glycerine for nitro	"	.11@.11½
FELDSPAR—Ground	sh. ton.	9.75@10.00
FIRE BRICK.		
American	per M.	20.00@30.00
Imported	"	30.00@45.00
St. Louis No. 1	"	16.00
" No. 2	"	14.00
Extra	"	20.00@23.00
FIRE CLAY.		
St. Louis mill	per ton	2.50
FLUORSPAR—		
Domestic f.o.b. shipping port:		
Lump	sh. ton.	8.00@10.00
Ground	"	11.50@13.50
Gravel	"	4.25@4.50
FULLER'S EARTH—Lump	100 lb.	.80
Powdered	"	.85
GRAPHITE—		
American, ore, common	lb.	.01@.10
Artificial	"	.06
Ceylon, common pulv	"	.02½@.03½
Best, pulverized	"	.04@.08
German, com. pulv	"	.01½@.01½
Best, pulverized	"	.01½@.02
Italian, pulverized	"	.01@.02
GYPSUM—Ground	sh. ton.	8.00@8.50
Fertilizer	"	7.00
Rock	lg. ton.	4.00
English and French	"	14.00@16.00
INFUSORIAL EARTH—		
Ground Am. best	"	20.00
French	"	37.50
German	"	40.00
LEAD—Acetate, white (sugar of)	lb.	.07½
Nitrate, com'l	"	.07½@7⅞
MAGNESITE—Greece.		
Crude (95%)	lg. ton.	6.50@7.00
Calcined	sh. ton.	16.50@17.00
Bricks, domes, per qual. f.o.b. Pittsburg	M.	160@200
MAGNESIUM—		
Chloride, com'l	lb.	.01½
Sulphate (Glaubers salt)	100 lb.	.40@.50
MANGANESE—		
Crude powdered:		
70@75% binoxide	lb.	.01½@.01½
75@85% binoxide	"	.01½@.02½
85@90% binoxide	"	.02½@.03½
90@95% binoxide	"	.03½@.05½
Ore	unit.	.18@.20
MARBLE—Flour	sh. ton.	6.00@7.00
MINERAL WOOL—		
Slag, ordinary	"	19.00
Selected	"	25.00
Rock, ordinary	"	32.00
Selected	"	40.00
MONAZITE SAND—		
Guar. 97%, with 5% Thorium oxide	lb.	.10
NICKEL—		
Oxide, crude, 100 lb. (at .55 for fine metal contained		.35@.40
Sulphate, single	100 lb.	.22@.25
" double	"	.13@.15
OZOKERITE	lb.	11½
PAINTS AND COLORS—		
Litharge, Am. powdered	"	.05½@.06½
English glassmakers'	"	.06½@.06⅞
Lithophone	"	.03½@.06½
Metallic, brown	sh. ton.	19.00
Red	"	16.00
Ocher, Am. common	"	8.50@9.00
Best	"	16.00
Dutch, washed	lb.	.02½
French, washed	"	.01½@.01⅞
Paris green, pure, bulk	"	(.12) nominal
Red lead, American	"	.06½@.06½
Foreign	"	.07@.08
Turpentine, spirits	gal.	.64
White lead, Am., dry	lb.	.05½@.06½
American, in oil	"	.06½@.06⅝
Foreign, in oil	"	.09@.09½
Zinc white, Am. extra dry	"	.04½@.04½
Foreign, red seal, dry	"	.06@.06½
Green seal, dry	"	.06½@.09½
POTASSIUM—		
Bicarbonate crystal	lb.	$0 06½
Powdered or granulated	"	.14
Bichromate, Am	"	.08½@.08¾
Scotch	"	.08⅝@.08⅞
Bromide	"	.15
Carbonate (80@85%)	"	.03½@.04½
Caustic, ordinary	"	.04½
Elect. (90%)	"	.06½
Chlorate, powdered	"	.08½
Crystals	"	.08½@.10
Cyanide (98@99%)	"	.18@.19
Kainit (bulk)	lg. ton.	8.50
Manure salt 20%	"	14.75@15.50
Double Manure Salt, 48@53%	100 lb.	1.16½@1.19½
Muriate	"	1.95
Permanganate	lb.	.09½@.10
Prussiate, yellow	"	.13½@.13½
Red	"	.35
Sulphate	100 lb.	2.18½@2.21½
SALT—N. Y. com. fine 280 lb. bbl.		.72@1.18
N. Y. agricultural	sh. ton.	4.40
SALTPETER—Crude	100 lb.	4.25@4.50
Refined	"	4.50@5.50
SILICA—		
Ground quartz, ord'ry	sh. ton	9.00@10.00
Best	"	12.00@13.00
Lump Quartz	"	2.50@4.00
Glass sand	"	2.75
Infusorial earth, crude		25.00
Calcined and floated		32.00
SILVER—Nitrate, crystals	oz.	.36½
SODIUM—		
Acetate	lb.	0.04¾
Bicarb., ord., bulk, f.o.b. works	100 lb.	1.30
Extra domes, f.o.b. works	"	3.50
Bichromate	lb.	.06¾
Bromide	"	.07
Carbonated ash, high test, in bags, f.o.b., works	100 lb.	.42
Foreign, f.o.b. N. Y.	"	.75@.77½
Caustic, 60@78%, f.o.b., works	"	.85@.87½
Foreign, f.o.b. N. Y.	"	1.75@1.85
Chlorate, com'l	"	1.90@1.95
Cyanide, ("100% KCN")	"	.08¾@10½
Hyposulphite, Am	"	.18@.19
German	"	1.50@1.60
Phosphate	lb.	1.75@2.00
Prussiate	"	.02½@.02½
Sal soda, f.o.b. works	100 lb.	.09½@.09½
Foreign, f.o.b. N. Y.	"	.80
Silicate, concentrated	lb.	.85
Com'l	"	.05
Sulphate, com'l	100 lb.	.01
		.40
STRONTIUM—Nitrate	lb.	.09
SULPHUR—Best seconds, per ton,		22.25
Roll	100 lb.	1.85
Flour	" "	1.90
Flowers, sublimed	" "	2.20
TERRA ALBA—	100 lb.	.70@.80
TALC—North Carolina	sh. ton.	15.50@23.50
N. Y. Fibrous best	"	10.25
French, best	"	20.00
Italian, best	"	30.00
TAR—Oil bbl. (50 gal.)	bbl.	5.40
TIN—Bi-chloride, 45%	lb.	.09¾
Crystals	"	.22
URANIUM—Oxide	"	2.25@3.00
ZINC—Metallic ch. pure	"	.07@.09½
Chloride solution, com'l	"	.02½
Chloride, granular	"	.04½@.04¾
Dust	"	.05½@.05½
Sulphate	"	.02@.02½

The Rare Earths.

BORON—Nitrate	lb.	$1.50
CERIUM—Oxalate	oz.	.35
LITHIUM—Carbonate	"	1.50
LITHIUM—Nitrate	oz.	.60
TANTALUM—Acid	oz.	.40
Ore, 20% acid	lb.	.20
" 70% "	"	3.50
THORIUM—Nit. 49@50%	"	8.00@10.00
URANIUM—Nitrate	oz.	.25
ZIRCONIUM—Nitrate	lb.	10.00

Note—These quotations are for wholesale lots in New York, unless otherwise specified, and are generally subject to the usual trade discounts. Readers of THE ENGINEERING AND MINING JOURNAL are requested to report any corrections needed, or to suggest additions which they may consider advisable.